The Builder.

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What there is still to do in Glasgow.

HAVE tried, in two preceding papers, to tell, as far as we were able, the manner in which the progress of Glasgow has been aided by the citizens themselves, in the first place as individual members of that large community; and, secondly, in their collective capacity as a corporation. It must be admitted, we think, that those efforts have been most praiseworthy, and on the whole, they have been in the proper direction. But our readers will easily suppose, on considering the growth and extension of such an important city as Glasgow—although many difficulties may have been surmounted, that many errors must also have been committed, and that many evils still remain to be encountered.

Accordingly we purpose to devote an article to certain of these circumstances, in which we are afraid our tone can scarcely be that of our previous eulogy or commendation. Nor should our Glasgow readers regret our candid criticism; for they will have seen that we do not write either in a cynical or a depreciatory spirit. It must always be acknowledged that it is the vocation and the undoubted prerogative of the public press in this country to criticise such public measures as the improvement of great cities, particularly with respect to the principles and method by which reform is ultimately obtained; and it is scarcely necessary to observe that this journal has some right to be heard on such questions. Indeed, the *Builder* has had its own furrow to plough in this direction, or, to use a more appropriate metaphor, its own crossing to sweep; and it has been a dirty one.

The first fault we must find then is one about which there can be no dispute. We refer to the station of the Glasgow and South-Western railway which is certainly in a most discreditable condition. The platforms extend several hundred yards outwards beyond the station roof; and consequently the poor traveller and his traps may get into a miserable plight, after stepping out of the train on the platform, if he should arrive at the end of his journey in the midst of a heavy shower of rain. Then it turns out that the station is built like that of the Great Eastern railway at Fenchurch-street, at an elevation of 40 ft. or 50 ft. above the level of the street, and we need not stay to demonstrate the evils of this. The passengers make their exit by a single steep flight of steps, very much worn, and dangerous-looking, which we are certain must have been the scene of many severe accidents; and the luggage is conveyed by porters by a long, narrow tortuous inclined plane, to the regions beneath, under conditions of great risk, if not of positive danger. The somewhat imposing Doric portico which decorates the front of the station in Eglinton-street is no set-off to the gloomy hall and the dingy offices behind it; and there is no excuse at all for the prevailing dirt. Of course we shall be told that the traffic is very great; but then we reply that the profits are very good. Sir Andrew Orr, who is, we believe, chairman of the directors, told the shareholders at a recent meeting, that there is not better security for debentures on any railway in the kingdom. We hope Sir Andrew does not include the station in his estimate of the securities; for, if so, there might be grounds for differences of opinion.

The next fault we must find is with the general state of the streets. The most cursory inspection of the principal thoroughfares of Glasgow will convince any one in a moment that the surface cleansing is inadequate. It would be wrong to say that the streets of Glasgow are as bad as those of London. But they are very nearly as bad. The traffic in Argyle-street, for instance, is almost equal to that of Oxford-street; the omnibuses are larger, heavier, and frequently more crowded than those of the "General Omnibus Company;" and, since the principal thoroughfares alone, as it appeared to us, are paved with dressed cubes of granite, the cross streets of Glasgow, such as Stockwell-street and Maxwell-street, often present a shocking expanse of puddle—on wet weather especially. Glassford-street seemed, on one occasion, in the condition of a mews that had not been swept for a day or two; and the fact is, we discovered after careful inquiry, that the practice in Glasgow is to sweep the whole streets thoroughly, excepting, perhaps, the most crowded thoroughfares, *only once a week!* Now, this practice, we submit, is altogether insufficient to meet the sanitary requirements of a city like Glasgow, and is not at all in accordance with the spirit of the age. It is recorded in the Talmud that the streets of Jerusalem were swept every day. We do not see why modern Glasgow should yield in the matter of cleanliness (which is next to Godliness) to ancient Jerusalem! We must also point out that the footways along the lines of the principal warehouses are often impassable from the use private persons seem to make of the pavement when receiving or despatching goods. Miller-street, for example, is quite as much obstructed by drays and vans, with their huge horses, as Wood-street or Gresham-street, and very nearly as noisy. Yet here the authorities have thought fit to establish the library instituted by the late Mr. Stirling,—the only one in Glasgow, by the way, in which a stranger can consult any of the standard works. Of course the Glasgow streets suffer as much as those of any other large town in the matter of being cut up with gas-pipes and water-pipes at intervals more or less short; and this is an evil we predict which will grow in magnitude until it will become quite intolerable. Something towards a cure of this chronic disease has already been effected by the underground arrangements in the recent improvement of Southwark; and we see no reason why this or a similar plan should not be adopted in the projected streets to be made under the Glasgow Improvement Bill.* This, however, may or may not be a thing of easy accomplishment; but surely it would be an easy matter to keep the surface in better order. In connexion with this subject, it is curious to note the tendency of the Glasgow authorities to copy the names of the principal London streets. Regent-street, Oxford-street, Cambridge-street, and such like, are perhaps common property; but Berkeley-street, Grosvenor-terrace, Windsor-terrace, &c., are evident plagiarisms. There is even a tendency visible on the part of the inhabitants to contract, and therefore destroy, the euphonious nominative of Sauchiehall-street (*Anglicè*, *Willow-hall*-street) into something like Sahall-street or Soho-street! And what right has Glasgow, in the name of St. Eleanor, to set up a spurious Charing-cross! It is hardly worth mentioning the subject, for after all it merely involves a question of sentiment; yet we cannot help calling to memory the statute under the Mosaic law, and the penalty annexed to its infringement, concerning the removal of the ancient landmarks.

If we pass from the streets and examine into the method of removing the refuse and garbage from the private dwelling-houses, we are afraid we shall find equal grounds for censure. In this process of cleansing,—as contradistinguished, however, from surface-drainage,—Glasgow differs in one important respect from Edinburgh and other Scotch towns we have inspected, and we are sorry to say for the worse. Ash-pits are universal. Not in the older quarters of the town alone, but in the most fashionable modern streets, it is the custom of the inhabitants to empty the whole dust, ashes, kitchen garbage, and other refuse, into an ash-pit or dust-bin in the court or back yard; and this accumulation is supposed to be removed by the authorities, at least once a week. We shall also suppose in all charity, that the duty is always faithfully fulfilled to this extent; and that no residuum of the filthy *débris* is left to contaminate and ferment the succeeding heap. But even then it will not suffice. We are too well aware in these days of the disastrous consequences which flow from the accumulation of any sort of vegetable matter—garden refuse, even—when freely exposed to the action of moisture, to expect that the contents of these ash-pits will not follow the natural law of decay and putrefaction.

There is obviously no excuse for this antiquated system; and the only reason which we can discover for it is an historical or traditionary one. Glasgow has always been distinguished for its dung-heaps (*Scotticè*, middens). In the year 1751, for example, the street which is now called Argyle-street was the principal thoroughfare in the west end of the city; yet the roadway was a favourite place for the deposition of dung, huge heaps of which were accumulated until they obstructed the thoroughfare. The same evil prevailed to at least an equal extent within the quarters of the Gallowgate and Salt-market, notwithstanding numerous proclamations of the magistrates to the contrary.* We cannot help pointing out here that this continual *law-making* and *law-breaking* is one of the greatest curses of Scotland, and would seem to indicate some gross defect either in the constitution or the administration of its municipal codes.

We were glad to perceive that a vast number of Macfarlane's cast-iron "stopping-places" had been erected, some of them, as we have pointed out, in highly disconformable situations, throughout the streets of Glasgow. We are sorry to find a single fault with these useful sanitary appliances, but the fact is, many are not supplied with water in any form, consequently they act, in hot weather, as so many alembics for the distillation of those gases with which our railway stations are so peculiarly well perfumed. With such an abundant supply of water as Glasgow possesses, it would be

* See illustrations in the *Builder*. Poor Tom Hood used to call this intermittent process of excavation "the City grave-digging." Our readers will doubtless remember his humorous stanza:—

"'Grave-digger,' I said, 'what grave diggest thou
In the heart of London town?'
And the deep stern voice of the digger replied,
'We're a-laying a gas-pipe down!'"

* Some of these curious municipal edicts are preserved in Mr. Pagan's admirable work, "Glasgow, Past and Present."

an easy task to abate this nuisance, at all events. We tried to find a corresponding number of public water-closets, but we failed.

We must now say a few words about the drainage. It is not our object to describe the entire system of the drainage of Glasgow, which, as we have already stated, is very good,—at all events, in its construction, so far as it goes; but we may try in a few words to describe its leading principles with respect to levels and outlets. Glasgow lies, of course, in the basin of the Clyde, on the slopes of a valley more or less distinctly formed by the action of the river on its circumjacent rocks. The natural drainage outlet is therefore the river and its confluent streams, such as the Molendinar Burn and the Kelvin. Confining our observation to the northern side, it is easy te see that there is a gradual elevation of level somewhat like that which occurs between Upper Thames-street and Islington. In fact, we may trace from the Clyde to the rising grounds above a parallel series of plateaux, the most important of which runs from the cathedral along by North Hanover-street, the top of Buchanan-street, at Gurscube-road, Garnet-hill, the Crescent-hill, and Gilmore-hill. Above this the highest level is reached at Port Dundas on the line of the Firth and Clyde Canal. One of the most startling phenomena which the stranger in Glasgow can come across is to see for the first time from Glasgow-bridge, where he may be viewing the shipping, perhaps, at the Bromielaw —his horizon bounded on the north by another forest of masts 200 or 300 ft. above the level of the river! It looks like an optical delusion until the explanation is made of a canal being there. It will be seen at a glance, therefore, that the drainage of Port Dundas must command the flow of the sewage which proceeds from the lower levels, and there is absolutely no separation of the systems. Let us observe the consequences. Port Dundas is a region of chemical works, distilleries, bone works, glue works, parafine works, and patent manure manufactories. We know from sad experience the nature of the liquid refuse which these enterprising people pour into the drains. Supposing one manufacturer to send a waste product of sulphuric acid or ammonia; a distillery some decoctions of grain wort; a cotton manufacturer the oily liquid peculiar to his trade; and the others some crude parafine, some hot glue, and some phosphoguano,—there would be found in that sewage matter the elements of the most poisonous gases which it is possible to imagine. But if we add to this the ordure from waterclosets, and the drainage from sinks, the entrails of putrid fish, and the hot water in which vegetables have been boiled, together with a proper and always necessary quantum of the liquid manure of the streets,—we should then get a combination the most horrible which a sewer could produce. That is, however, only the theory of combination in this case: let us inquire for a moment how stand the practical results. During hot or dry weather a bad smell proceeding from the sewers pervades the whole of Glasgow! There are gully-holes in the City-road from which is vomited a combination of smells so bad—so infernal, as they were on one occasion described to us—that a horse would shy at them! There are houses we saw in St. George's-road in which it is impossible to open the windows; some of which houses were, at the same time, damp from their faulty construction. The consequence was that in two days the carpets were covered with minute *fungi*, and the clothes in the wardrobe with green mould. But these are not solitary cases. At the head of Buchanan-street, at Blythswood-square, in Garnet-hill, even in the fashionable crescents, in short, wherever an elevation occurs such as we have already pointed out, the soil-pipes of the houses act as so many conductors or ventilators to the sewers; and during certain periods of the year some of the best houses become simply uninhabitable from bad smells, for which, moreover, no one seems able or willing to account, far less to cure! Here, then, we venture to say, is an evil of the first magnitude. Until Glasgow shall have been thoroughly sewered on two or three separate systems our firm conviction is that the best and highest class of property will be subject to constant deterioration in value; and the health of the inhabitants will suffer a corresponding lowering of the vital forces. It will be observed that it is not the mere house drainage alone they have to contend with; those horrible gases we have pointed out are actively interfused through the whole system of sewerage. Systematic flushing, in our opinion, would only aggravate the evil; and no method of trapping with which we are acquainted could surmount this fatal influence. For, if repressed by water, the gas will in time saturate the water; if by valves it will in time burst the soil-pipes. It may, indeed, be possible for the speculative builder of fashionable tenements so to manage his drains that he sells the property; but in a year or two the evil will be as bad as ever. In point of fact, one has only to observe the marvellous falling off in a few years of the rental of certain streets, such as those on Garnet-hill, together with the constant per-centage of deaths from fever which occur in the same streets, to arrive at the just conclusion that some unseen but deadly enemy to life and property has been silently indeed, but actively and surely, doing his diabolical work! It has of late years almost grown into a postulate of sanitary economy that the higher a house is above the level of the river the healthier it is. And such is, no doubt, the case, all other things being the same. But one important principle must form a necessary condition to its general application, and that is, that the gully-holes of the street and the soil-pipes of the houses shall not serve as conductors to the sewer-gases which are generated at the lower levels. We are sorry to say that this principle does not exist at this moment in connexion with the Glasgow drainage; and accordingly if we had the good fortune to pay scot and lot in that enterprising city, we should choose to dwell at a lower level, if not on the banks of the river itself.

Only we are afraid as to the Clyde that,—

"There's *no* path by the river o'ershadowed with trees"

that could be described, with truth, as being salubrious, nor no wood near which a poor valetudinarian in quest of pure air would seek to build a cottage. For the difficulty we have to contend with here is, that the river is itself little else than a huge and abominable cesspool. We are sorry to be compelled to use such language respecting the Clyde, which is a river of great natural beauty, and has been the object of much careful and costly improvement. The Glasgow people are very proud—and justly so, in our opinion,—of their great achievements in dredging, deepening, embanking, and constructing quays to this noble river. Although we can hardly endorse the eloquent panegyrics of certain local authors—who compare the efforts of the ancient Egyptians in building the Pyramids of Cheops with those of the Glasgow merchants in making the Clyde navigable — we are still perfectly prepared to recognise all such efforts, and to appreciate their good results. To this end we must say that a great effort yet remains to be made. It is quite impossible that the present system of discharging into the river such conglomerate sewage matter as Glasgow continues to yield in annually increasing quantities can last much longer. We have not made the calculation per head of the population, and there is no data extant that we know of respecting the drainage products of manufactories. But it would be comparatively easy to form some approximate measurement of the quantity of liquid sewage poured into the channel of the river; and the result, we suspect, would be startling. It is, indeed, a sickening sight, particularly on a hot day, to observe the process of contamination. Let us take our stand on the Suspension-bridge. Every two or three hundred yards on both sides of the river, and about 6 ft. under the crest of the embankment, we may detect the mouth of a common sewer belching forth a small cataract of fluid of the colour and consistency of diluted London porter. When the tide is out, and the filthy torrents discharge themselves in innumerable rills over the dark, slimy, bubbling sludge which covers the *alveus* like a stratum of coal tar, and when this occurs under the glare of a hot sun, the smells proceeding from the river are such as to baffle all description. Certainly they have nothing in common with "the spicy gales of Araby the blest." The worst feature of the case is that the Clyde, being a purely tidal river, the sewage matter held in suspension is carried backwards and forwards with the flux and reflux of the tide; and, moreover, every increase of the volume of river water at the basin of the Bromielaw serves only to increase the diffusion of the ill-agglomerated and unhealthy particles.

The river itself being in this condition, we can hardly look for much improvement in its tributaries. The once beautiful Kelvin, after bidding farewell to its upland glens and their healthy atmosphere, is seized upon at Port Dundas, and after being poisoned there and receiving all the sewage of the adjacent streets and crescents, it steals away, foul and contaminated, through the West-end Park, and finally disappears through the wheels of the flour-mills at Partick. It forms anything but an ornamental water to the beautiful park, and its condition, we have reason to know, caused Sir Joseph Paxton much trouble and annoyance. On a hot day the easiest way to discover its aromatic qualities is to stand for a few moments on the bridge which crosses the little river and forms the junction between the Great Western-road on the one hand, and Durwan-hill on the other. We need not be too specific. All we can say is, that the sensation is anything but refreshing or agreeable. The Kelvin, however, is totally eclipsed in depravity by the state of the Molendinar Burn, which we can only compare to the Fleet Ditch before it was covered in and converted into the Holborn sewer. Nevertheless, it still sweeps round the base of the ancient cathedral. For the purpose, we suppose, of preserving a respectable-looking body of water at this point, a weir is erected under the bridge which crosses from the cathedral churchyard to the necropolis—a structure which is not inappropriately designated "The Bridge of Sighs." But, whatever may have been the intention of this provision, its principal effect has been to produce only a pool of filthy and stagnant sewage, which must doubtless exercise its own influence on the atmosphere of the cathedral on a hot Sunday in July. This sewage stream next passes, without any cover, or even fence, through the open spaces of Drygate, where the small boys amuse themselves with splashing brickbats and broken bottles at the dead cats and such like objects of interest; then it flows by a culvert underneath the foundation of the jail, doing some duty, we suspect, in the punishment of the Glasgow criminals; and again it emerges once more into open day, on the opposite side of Duke-street. Here it receives the waste steam and other superfluous products of a large cotton manufactory, passing at the same moment, we observed, under the broad flanges of an undershot wheel! After this it finally loses itself somewhere underground beside the miserable quartiers of South Pettigrew-street and Bridge-street. We should not like to be thought guilty of an exaggeration; but we scarcely ever remember, unless it were on one occasion, in a knacker's yard, to have had the evidences of a disgusting smell so strongly brought home to our senses as we had on overlooking this ditch for a moment, at the point of its contact with the cotton-mill in Duke-street. Nor was our disgust unmingled with regret; for this little streamlet, now so fearfully polluted, has a history as old as that of the Thames or the Severn. One of the earliest traditions with regard to the origin of Glasgow, is that the Druids had an altar on its banks in the surrounding forest. It had undoubtedly determined the site of the ancient cathedral; and it is equally certain that St. Mungo had consecrated the silver stream, and had baptized his converts in its pellucid waters. These are not the days of primitive Christianity, we shall be told. This is the era of commerce and manufactures. Well; we do not see why the latter epoch should not imitate the former in preserving the purity of its rivers among other things!

If anything were wanting to complete the circle of polluted waters with which Glasgow is encircled it would be furnished by the canal at Port Dundas, which is in a worse condition than the Regent's Canal, and that is saying a great deal. But the canal is not the worst feature of Port Dundas. We have previously indicated the nature of the manufactures in this colony of chemical works, and described the influence they exercise over the lower-level sewage. That is also bad enough; but it is nothing in one sense, compared to the "foul and pestilent congregation of vapours," which they pour into the atmosphere of the city. There is not the least doubt but the most vital of all the sanitary questions in Glasgow at this moment is—how to purify its atmosphere. But this we are afraid is a wide question, and cannot be properly discussed unless in a separate article. We shall conclude our present remarks with a few observations on what we must regard as defective police arrangements.

There can be no doubt, we think, that a good many of the social evils under which Glasgow suffers is to a large extent due to the conflicting jurisdiction of its various municipal authorities. There are at least a dozen of separate and distinct local boards in Glasgow,—the town coun-

cil, the police commission, the Clyde trust, the water trust, the statute labour committee, several poor-law boards, and a multitude of subordinate committees, springing from their parent stocks, which all possess more or less of an administrative character within the same category of duties. For example, there are inspectors of nuisances under the Poor-law Act, inspectors of cleansing under the Glasgow Local Police Act, a medical officer of health under the General Police Act for Scotland, inspectors of police, an inspector of markets, and an inspector of gas-meters, &c., under the recently applied Gas Companies Act. The Lord Provost, in his capacity of chief magistrate, is of course chairman of most of these local boards; but they are, nevertheless, separate members of the municipal body, under different Acts of Parliament, with a distinct constitution, and always provided with separate clerks. The clerks are also the law-agents for their own peculiar Boards. Can our readers wonder, then, that these bodies carry on a state of chronic internecine warfare with each other; that litigation or legislation in some shape constitutes the principal business of the statutory meetings; and that this is always carried on at the cost of a generous and discerning public? Those who wish to study well the progress of large towns in Scotland must devote some time to the principle by which the corporation clerks are also appointed the law-agents of their constituents; and the study will, we are certain, shed much light on the heavy increase of public burdens! The genius which these gentlemen evince for levying assessments,—that is to say, taxes upon the communities over which they exercise control,—was described to us on one occasion by an impoverished house-owner as being quite equal to the genius of Rob Roy for levying black-mail! Our chief fault to them, however, is of a professional character: they are the enemies of all systematic progress and improvement such as a town architect or engineer might easily effect without any litigation at all! How is it that we hear so much of the Lord Provosts in Glasgow and Edinburgh, and so little of Mr. Carrick or Mr. Cousin? How is it that sums so enormous are spent every year in promoting Acts of Parliament,—abortive for the most part, and so little expended in positive requirements? The most ingenious town clerk, and the most patriotic Lord Provost, even supported by the most comprehensive police Act under the sun, will fail, in our opinion, to make a city clean unless the improvement be carried out and constantly supervised by a competent engineer. It is too much the fashion, we suspect, to postpone the services of this class of men to those of the town clerks and their legal concurrents; and the fact is, we have come to the conclusion, after long experience of the subject, that those towns which have the greatest number of police bills, and are best provided with local Boards, are the most ill-governed, the worst cleaned, and the most heavily taxed.*

Besides, if all this legislation were actually to accomplish its intended purpose, there would be nothing to regret, perhaps; but such is not the case. In the first place, we must point out that there is great need for a good Building Act in Glasgow. We will not stay to illustrate this by examples taken from contemporary construction, and we are glad to acknowledge that nature has done much for the builders in providing free stone of splendid quality and in inexhaustible quantities. An 18 in. or 2 ft. rubble wall is certainly one of the very best securities against fire; nevertheless, fires are of far too frequent occurrence. We happened to observe an erection of shops in progress in Sauchiehall-street, and the whole range of six or seven fronts were only separated from each other by ¾-inch deal, nailed on cross standards at the floors and ceilings. It is quite clear that a fire in one would speedily reduce the whole to the ashes, and seriously endanger the houses behind. Again, we noticed a most conspicuous case of unenclosed area, 6 ft. deep, in Bothwell-street, along the whole basement, some 300 yards in length of that handsome range of buildings, where Messrs. Hutchison & Co. have their offices. There was not the slightest vestige of a railing. It is true there were steps from the pavement downwards; but it is scarcely necessary to say that a man might split his skull by falling down 6 ft. of steps on a dark night! It is also very grievous to behold the manner in which the foot pavement is cut up and interrupted by masons' sheds whenever a new building or an alteration is going on. It never seems to occur to the Lord Dean of Guild, or whoever is the presiding spirit of the building regulations, that in stepping from the footway to the roadway of a crowded thoroughfare in consequence of such obstructions, the passengers risk being run over and killed! But this is an excellent type of the general principles which characterise the whole of the Glasgow municipal government.

We have already spoken of the cleansing; let us give a few illustrations of another species of neglect. The magistrates, in virtue of their *nobile officinum*, are, in addition to their other duties, the administrators of the Public Houses Act, or the Forbes-Mackenzie Act, as it is called in Scotland; and they delegate this disagreeable duty to the police. Accordingly, the chief part of a policeman's duty during the night consists of watching low public-houses and unlicensed sheebeens. We will not speak of the bribery and drinking to which the constables are exposed; but the legitimate consequence is that their other duties are neglected, and hence garotting and robbery, we are told, have prevailed to a frightful extent in Glasgow since the operation of this attempt to make Scotsmen sober by Act of Parliament. Fires, too, are of more frequent occurrence, it is said; but we will do the Glasgow policemen the justice to say that they make plenty of noise, at all events, about a fire when it breaks out.

Tired with a long day's walk through crowded and noisy streets, his brain fired with a multitude of new and totally strange ideas, his heart sad and depressed at the sight of much misery and wretchedness, amidst so much wealth and opulence, we shall suppose the traveller through Glasgow has, at length, sought his weary pillow.

> "Light thickens; and the crow
> Makes wing to the rooky wood."

The noise of the lumbering omnibuses gives way to that of the cabs; and even this rattling noise is gradually hushed in the silence of the middle watches. A vision of gentle dreams, Highland lakes, herring-boats, mountain streams, waterfalls, heather hills, rocky passes, purple clouds, northern mists, gradually suffuses the slumbering yet curiously sentient intelligence; and the weary traveller sleeps in peace. Suddenly the stillness of night is invaded by the horrible concatenation of sounds which can be produced alone by the watchman's rattle; and a stentorian voice is heard shouting at its full pitch—repeated again at the intervals of about ten seconds—*Fire, at* 329, *Trongate!* Up starts our poor sleeper, as much alarmed as Isaac Shove was when Toby Tosspot performed peal the first! He will reflect, in all probability, although this is an odd proceeding, that these Glasgow people are careful of their warehouses, and a fire is a dangerous thing. It may be as well, perhaps, to alarm the community: an ancient custom, doubtless,—Watching and Warding, Burgers, Border feuds, Beacon fires; and he has hardly again succeeded in reaching the arms of Morpheus, under this new set of ideas, when his slumber is once more rudely broken by the same diabolical rattle, and the same stentorian lungs. This time (peal the second), the fire is in 645, *Buchanan-street!* No relapsing into slumber a second time, for in a quarter of an hour afterwards, perhaps, comes peal the third,—128, *Virginia-street!* and so it may continue at stated periods during the night. After long and sleepless consideration, the stranger will probably come to the conclusion that he has fixed his quarters in the regions of the central fire-brigade of Glasgow, and that he will change his hotel next day. But alas! he will learn next day that the practice is universal and coincident with the boundaries of the city; and he will find his disgust not a little heightened by reading in the morning papers that there had been only two fires in Glasgow during the night (the others had obviously been false alarms), which had been got under, however, without the necessity of turning out the engines; and that Councillor Higginbotham and Bailie Muckleworth had distinguished themselves greatly by being early on the spot!

But in case it should be supposed that there are no similar annoyances during the day, we must ask leave to adduce one other example. Some parts of the New Town of Glasgow are built, as we have tried to explain, upon a series of eminences, at the base of which lie the parallel thoroughfares. Branching from these main streets, at right angles, are numerous cross streets, such as Hill-street and Dalhousie-street, which vary in their gradients from one in ten to one in five. Some streets, indeed, such as Hanover-street, are almost too steep for even an empty cab. Nevertheless, every morning from six to eight o'clock the painful process may be observed of an old broken-down cart-horse vainly striving to mount those hills with a heavy load of coals. The attempt is painful to see; it is still more painful to hear; for the coal-carter is usually most lavish of his whip and his lungs; and his language of objurgation—which the poor horse doubtless understands—proceeds from *forte* to *fortissimo* in a string of oaths and imprecations so horrid that we dare not venture to transcribe them in our columns! Need we add that the poor horses, overgoaded and overloaded, often fall under their burden; but not till then is the brutal operation suspended. We saw this dismal scene enacted at least twenty times during our short stay in Glasgow; and we never saw the police interfere once.

Nor is the inhumanity of the Glasgow police confined to the lower animals. Otherwise, how is it that the poor servant-girls are permitted to expose their lives so freely in cleaning the windows? We have seen a group stuck over the elevation of a house like butterflies, with expanded hoops, of course, and streaming caps. One on the first floor of one house; another on the second floor of the next house; a third on the floor above; and, finally, a poor ignorant girl from Argyleshire or Bute, cleaning the outside of the attic windows at an altitude of 50 or 60 ft., with her feet resting on the gutter or on the course. We shall not be surprised if it be found in the social statistics of Glasgow that a constant percentage of these girls are killed with falling into the area or perhaps getting transfixed on the railing! Their very temerity, we were told, constitutes their safety. But that is surely a slender reed on which to trust. If the evil consequences stopped here the remedy might be easy; but the practice we suspect brings about a certain callousness and indifference to the risk of human life which must be demoralizing to the whole community. It is perfectly shocking to see the manner in which children are exposed at the open windows of the top flats; and no class of fatal accidents are more persistent in Glasgow than deaths arising from the fall over a window. How very narrow the margin is in which the balance may be destroyed is well known to those who have studied the laws of statical equilibrium; but it would be absurd to expect such knowledge at the hands of those poor people who fall victims to their ignorance or their temerity; or, if we must use more precise phraseology, whose instincts of self-preservation are not equal to the complicated circumstances in which they find their conditions of existence.

Commending these observations to the attention of the Glasgow authorities, we conclude for the present by expressing the hope, that while Glasgow flourishes in commerce and in manufactures, she will not neglect to cultivate the softer graces of social amelioration. The philosophy is rapidly gaining ground in these days, that the civilization of a country or of a city is to be estimated, not so much from its wealth or its magnitude in relation to other cities or other states, as from the position it has gained in the great commonwealth of Humanity. There are no surer tests of this position than the evidences which it can present of a sound constitution and a good heart,—that is to say, of its public health and its public morals.

* Take Glasgow, for example: the police-rates alone for this year amount to 2s. 6½d. per pound of annual rent on a property situated within the regality! This is exclusive of poor-rates, prison assessment, &c., and it is, moreover, the highest rate ever levied within the city of Glasgow.

HOW LONG WILL LONDON BE HABITABLE?

THE sun in his course through Cancer, in this the 2,620th year from the foundation of Rome, has shed light on strange and unwonted scenes in the ancient capitals of Europe. In the Seven-hilled city the chief of Latin Christianity has found in the assemblage of the unprecedented number of 500 bishops, who have paid no empty-handed visit to their superior, an encouragement for a fresh defiance of the evils of civilization and the infidelities of science. Almost at the very time that the reiteration of the loftiest claims of the Pontifex Maximus have been uttered to the hundred and fifty millions of the Romish church, the two other chief sacred personages of monotheistic worship, the head of the Greek church, and the Caliph of Islam, have thrown

the weight of their authority into the opposite scale, and have admitted themselves to be disciples of the great intellectual revolution of the century, by their respective visits to its head quarters and parade-ground at Paris. The presence of the Sultan and of the Czar in France is a fact more significant than is the gathering of the Episcopate at Rome, even as the *élan* of troops on the march is more formidable than the most resolute determination to stand fast behind the intrenchments of the camp.

Of those princes who have so far broken through the habits of centuries as to visit the world's fair in the French capital, the two whose presence in that magnificent city was the most marvellous, have not been content to return to their Oriental seclusion without visiting our own island. Thus the flag which even within the last century has hovered around our Western coasts in a manner called piratical by our ancestors, has floated over Buckingham Palace, and the Sultan of Turkey, the Caliph of the Mahommedan religion, has partaken at Windsor of bread and salt with the Defender of the Faith. Which sovereign had the most distinct recollection of what was intended by the founders of the great knightly orders may be doubted by those who remember that the Sultan wore a Christian decoration.

London prepared itself to welcome his highness. Of courtly reception there was no lack. The heir to the throne and his Royal Highness the Commander-in-Chief paid graceful honours to the Padishah, whose arrival divided the attention of the town with that of the Belgian volunteers. But the Egyptian Viceroy, a prince now inferior to the Sultan himself in little more than name, has only narrowly escaped being sent to an inn owing to the public spirit of a private nobleman. Disinterested individuals, indeed, writing anonymously in the daily papers, were good enough to offer the use of more than one palace, without asking the consent of its master; but not even this futile attempt at a vicarious hospitality has been able to disguise the fact, to which we called attention some time since, of the disgraceful want of accommodation in London for the guests of the nation. If the sovereign invite a guest it is for the sovereign to entertain the visitor; but if the nation invite, or if the visit be not that of one brother sovereign to another, but that of a prince to a great capital, and to the home of a mighty nation, it is not only a discredit to that nation to have no abode in which to offer hospitality, but, in relation to Oriental monarchs, it is a degradation of the national character which is likely to have bad commercial results. The English influence in Egypt, the English prestige throughout the Mussulman world, could hardly receive a more marked and mighty buffet than would have resulted from sending the Viceroy of Egypt to a Khan. That such a prince should be received in a manner worthy of his position, as the keeper of one of the keys of India, and that the English nation should have been able so to receive him, without being beholden to any individual of whatever station, every one must admit to be proper. It is more than proper—in the way in which some men look at matters;—to be unable to do so may involve a serious political blunder. The absence of any fit house of reception for foreign princes at the Court of London might, with men of a temper by no means extinct in the East, have closed our overland traffic with India, or caused an ugly want of continuity in the wires of the Indian telegraph.

The want of accommodation has led us to other thoughts. With the rapid growth of our enormous capital, it is not impossible that a comparatively short time may make a sensible difference in the comfort with which it may be inhabited. In the present year the prevalence for several days together of a south-east wind, charged with the atmospheric temperature due to the source whence it blows, has borne to the vicinity of the parks the dense canopy of the smoke and vitiated atmosphere of nine miles of buildings. As the circumference of the vast city extends, so do the dwellers near that circumference suffer more and more whenever the wind sets towards them across the metropolis. In that large district which lies near the course of the North Western, the Metropolitan, and the Kensington Railways, the difference in the facility of breathing during a south-east and a north-west wind is almost incredible. With each annual addition to the space built over, this evil is exaggerated. We are without experience to guide us as to its limits and future results. We have from two and a half to three *per mille* of the whole human race crowded into a space of some 122 square miles. The means by which Nature restores the equilibrium of animal and vegetable respiration, and takes up by the latter process the poisonous gases thrown off from the lungs of animals, are almost entirely banished from this area, and the slight remains of vegetation are daily diminishing. The actual cubic volume of air daily vitiated over this space is a matter of importance. More than six hundred millions of cubic feet of carbonic acid gas are expired in London in the course of twenty-four hours by human beings alone, irrespective of smoke and of the gaseous products of combustion, and irrespective of all other sources of vitiation of the atmosphere. This quantity of carbonic acid will render twenty times its weight of atmospheric air unfit for the support of life. Thus, if we imagine a perfectly calm day, in which the respiration of London should hang within the limits of the thirty-six metropolitan districts, and if we then suppose that, for the purpose of removal by currents of wind, the air thus vitiated were poured into the streets, to the exclusion of the space covered with buildings, it would fill the whole roadway and footway of the metropolis to a depth of between 8 ft. and 9 ft. This is the amount of poisoned air which London must daily exchange for fresh; and, in the course of the necessary process, whether more or less rapidly performed, what is the state of the suburb over which the whole mighty column of vitiated air is steadily propelled?

In calling attention rather to the organic sources of atmospheric impurity, than to the effects of actual combustion, it must be remembered that the latter, if less subtle in their influence on human health, are of overpowering magnitude. An average quantity of upwards of 14,000 tons of coal is daily consumed in London, some 30 to 40 per cent. of which may remain in the form of ash, or may be thrown into the atmosphere, in the partially volatilised form of smoke, while the remainder, converted into carbonic acid by the process of combustion, joins with the actual human and animal expiration which is constantly accumulating in close and unventilated localities. But it would seem as if the absolute chemical quality of the air were not the sole, or perhaps not even the chief element of its effect on human health. Temperature, no doubt, has much to do with the matter; but there can be no doubt that the summer effluvia of life in the metropolis, when the daily consumption of coal is at the minimum, are far more offensively appreciable than is the case in the winter. The carbonic acid expired from the lungs may be as yet indistinguishable by chemistry from the carbonic acid produced by animal combustion; but that there is in the expired air a noxious quality distinct from, and more pernicious than, that for which chemistry is responsible, we think few will be prepared to deny. The carbonic acid gas emitted from three million human lungs may be chemically indistinguishable from that disengaged from the fourteen thousand tons of coal consumed per diem in the metropolis; but with the produce of respiration we cannot doubt that there is mingled a miasma quite distinct from the effluvia of the furnace. Thus we find on the leeward side of London, in this summer weather, while the July sun is obscured by the canopy of unconsumed carbon, the current of polluted air that creeps through the streets is such as to affect even strong men with a sense of faintness. When a slow but steady draught sweeps the confined air gradually from the metropolis, those districts over which it last passes, in this summer heat, seem unfitted to allow the chest to expand with a healthy respiration.

If this be the case (and we can appeal to daily experience on whatever happens to be the leeward side of the metropolis), now, what will be the case at the close of the present century, by which time we may expect London to contain six million inhabitants? The actual experiment of how large a city can be made seems to be in rapid course of solution.

It is not our wont to be alarmists, or even to point to menacing evils without the purpose of suggesting a remedy. The increasing difficulty of living in London in the summer, notwithstanding the immense improvement in the purity of the Thames, becomes every year more oppressive. One remedy, or rather palliative, must, sooner or later, be found in the appointment of some competent professional men as Ædiles, or officers answering to that description. In the province of such officers would fall the provision for the architectural wants of the metropolis, the preparation of a palace, in which the visits of foreign sovereigns might be properly received, and in which our own sovereign might welcome her subjects. With many noble buildings for public assemblages, theatres, concert-rooms, commercial halls, we must not forget that the only apartment in London fit for the state of a great court is traced to the son of the Norman Conqueror, and that even this is ordinarily made use of only as a corridor. A palace in which the Queen can hold her court is as much a requisite in the present day as one in which the nation can welcome its guests. Neither one nor the other exists among us. But while we require an ædile to build our palaces, no less do we require the services of such an officer to superintend the general outline of our rapidly increasing suburbs. In many instances where properties march, mutual inconvenience seems to be the law. Long lines of street, opening a fair avenue not only for traffic but for the circulation of air, are often cut across by crescents, or terraces, or even mews, placed at the mere whim of the landholder, to the immense detriment of the whole town. Instances of this kind are familiar to every inhabitant of the West-end, and the impediments thus caused both to ventilation and to traffic are daily becoming more serious. That London should be regarded as a whole, and that individual caprice on the part of the various landholders and speculators should be kept within the bounds demanded by public health no less than by public convenience, is daily becoming more imperative.

That the time will come, sooner or later, when the work of the ædile will be useless without the aid of the chemist, there are already pretty strong indications. Those very spots which, with the wind in twenty-four points of the compass, enjoy all the advantages of pure country air are the most oppressive during the prevalence of breezes from the remaining eight points. You go to bed under a pure sky and in fresh air; you awake with a feeling of oppression, under a sky that looks like the mouth of an enormous chimney, and find that the only change is that of the wind, by which you have become leeward of London. Thus the most agreeable suburbs for nine months out of twelve, become the most unendurable for the remaining three; nor can you tell even for a day when either condition will prevail. If chemistry can offer available assistance, if science come in aid, consuming smoke, liberating oxygen or ozone within the limits of the metropolis itself, and fixing or neutralizing the gaseous products of respiration or of combustion, we may see a new chapter in the history of great cities. But unless something of the kind be effected the present century bids fair to witness a different solution of the problem. We have lived to see third-rate towns larger than Aristotle thought that independent states would ever become. We may live to see light thrown on the question how far the laws of health and the necessities of respiration will allow of the constantly increasing agglomeration of the centres of population.

ANOTHER NEW SCIENCE.

IT is becoming more and more difficult every day to determine the pale of science. Once upon a time "the circle of the sciences" was a current expression that implied a certain and well-defined sequence of studies. Works of reference of the period of the foundation of the Royal Society speak of the "seven liberal sciences" as grammar, logic, rhetoric, arithmetic, geometry, astronomy, and music, or musick, as it was then spelt: these stood within the pale; other subjects stood without. But now-a-days this exclusiveness has been cast aside by the scientific world, or it has been in some way overthrown; and it is, as we have said, more and more difficult to say of anything that it is beneath the dignity of science. A remarkable example of this expansion, or this comprehensiveness, in the minds of *savans*, is presented in the creation of a new section in archæology under the presidency of Sir John Lubbock, which is to treat of prehistoric matters only; but a still stronger illustration of the same fact is shown in the ready acceptance given to folk-lore as a subject likely to be developed into a new science. The genial, fanciful, German fairy tale-teller, misnamed Grimm, opened the way for this recognition in his startling suggestion that our household tales, with their giants and giant-killers, are probably

fragments of a mythology that has now nearly faded from human knowledge. This seedling of a hint, with a fecundity only second to that of the magic bean-stalk, threw its tendrils around several collateral subjects and drew them together in one entanglement. Charms, cures, credulities of various kinds, old sayings, curious customs, legends of wonderful creatures such as the "laidley worms" of Northumberland and Durham; the investiture with supernatural power of certain objects, such as wishing-wells, the ash-tree, and various herbs; the lip-lore, in fine, of the simple, are now looked at with a new interest as likely to be of an antiquity equal to that of our stories. To collect these several scholars have set to work; but their labours are shadowed with regrets that they are so late in commencing them, for the last two generations have lost much of this kind of lore. Our grandmothers could have furnished thrice the quantity. We say grandmothers advisedly, for charms, cures, interpretations of dreams and portents, unaccountable customs generally, but especially those attendant upon births, deaths, and weddings, the supreme incidents in man's existence, were, till the present day, left unclaimed as a worthless possession in the hands of the aged ladies north-country people call "auld wives." Though unclaimed they were not, however, unheeded; for we suspect there are few persons, even now, without a corner in their hearts in which early impressions have enshrined an illogical belief in omens, of good and bad luck; although there are, doubtless, still fewer who will own to such harbourage of fancies planted in their minds in the nursery. We contend, nevertheless, that if a wedding-guest saw a solitary crow as he was setting out to assist in the ceremony, and it began to rain heavily as the procession came out of church, and from the unexpected absence of other guests thirteen sat down to breakfast, at which the salt was spilt, and the bride and bridegroom accidentally crossed knives in the progress of the feast, and then recollected it was Friday, he would find himself arrived at the conviction, despite any amount of common sense or well-regulated condition of his mind, that the prospect before the wedded pair was not brilliantly alluring. The bridesmaids, we aver, would shrink from the wedding-cake, and no more think of putting a piece under their pillows than of eating it. A century ago, there were as few people who would deny a belief in such manifestations and portents as there are now who would own to it. Did not Horace Walpole, though his genius was of a discriminative order, call at Northumberland House, to take "my Lady Northumberland,"—soon to be Duchess of Northumberland,—to Cock-lane? Did not Göethe gravely record that his grandfather saw the principal events of his life enacted in dreams before they actually took place? Or, going farther back, did not the possessor of one of the most eclectic of minds, Martin Luther, in all earnestness recommend the murder of a child, under the firm belief that it was a changeling?

The more we think of this unwritten lore, the more curious it seems that we have hitherto only regarded it as ignorance and superstition, instead of remnants of an obsolete learning. It is not of to-day, for it has already fallen out of general circulation, and is only met with occasionally. Our so-called roughs know it not. Much of it is doubtless of Mediæval origin, but there is more that must be older still, and probably of Celtic antiquity. The Druids were remarkable for their learning, which, Latin writers agree, was all unwritten. We have remains of their altars and their ringed monolithic temples, side by side with our railways and telegraphs, wherefore not of their lore? We bring to light the contents of ancient graves and ancient caves, sealed we know not how many hundreds or thousands of years ago; we delve into grass-grown entrenchments full of circular foundations of pre-historic dwellings; we pick out of the accumulations of soil upon them arrow-heads, Celt-heads, antlers, bones, querns, pieces of broken pottery,—sufficient relics, in a word, from which we can gather how men lived in those remote times, how they hunted with flint-headed arrows, hewed down timber with stone-headed axes, built huts of untooled stones gathered from the valleys and hill-sides, where mighty waters had deposited them in still more remote ages, grew cereals on terraces on hill-sides and ground them; and must we conclude that though this amount of knowledge of a pre-historic people has survived every word of their thoughts, hopes, and fears, their rude experience and vague theology have perished? Surely here and there, disguised in modern phraseology, we may have preserved snatches of the talk and credence of these early times; and the "medicine men" of a semi-civilised people may be traced in the charmers, or wise men and women, of Mediæval and modern life.

We have had occasional collectors in this field, we may say, for centuries. But they have collected with a different object in view, and have therefore disregarded items that were not available for their purpose, notwithstanding their curiosity or interest. Bourne, for instance, wrote his "Antiquitates Vulgares," in 1725, with the expressed object of showing which of the popular customs and opinions might be retained with propriety, and which should be rejected as either Popish or Pagan; and his commentator, Brand, in 1777, follows in his wake, led by a conviction that his predecessor had not done justice to his subject, rather than with a view of applying his stores to an illustration of a history of the culture of the mind of man. Both traced many of the popular notions and vulgar ceremonies, as they called them, to the times when Popery was the established religion, and thence from Christian to ancient and Heathen Rome, but they did so with an ecclesiastical rather than historical aim. In the hands of Bourne, the fancies of the multitude became only so many unrelinquished superstitions, which want of reflection had incorporated with Christian observances. Brand supplemented this view by hinting that Christianity, first at its promulgation, and afterwards at the Reformation, had connived at the continuance of many ancient practices under new names, rather than run the risk of any violent alteration of the current of existing things. Sir Henry Ellis, in our own day, has largely added to the collections of both these worthies; but, as editor of their works, has naturally gathered together such curiosities as would best illustrate their stores, rather than add to the number. The collectors abroad now, however, are of a different order. Their object is to save from oblivion all knowledge of the floating traditions and opinions which one generation has handed down to another from lip to ear and from lip to ear again, without the agency of scribe or printing-press. Their task is a preliminary one: not a leisurely scanning of ancient literature for solutions as to the meaning or origin of a belief or of a custom; but a hasty gathering together of the remains of this unconsidered lip-lore, lest it should be altogether lost. Hereafter they may trace portions of it up the streams of ages, and across the face of the earth.

Let us consider the pretensions of our charmers, or wise men and women, as they are variously called. They can charm away long-standing and recurring complaints, such as rheumatism, ague, erysipelas, whooping-cough, epilectic fits, as well as minor matters, such as cramp or warts. They can interpret dreams, and they can dream where to look for stolen property, and thus aid in its recovery. They can decoct love-philtres, and advise young people how to proceed if they wish to see the individuals who are to be their future partners in life; and they can tell fortunes. In some of these matters a personal interview with the charmer is requisite, and special treatment is called for; but in the majority of cases the circumstances of a case are met by a selection from a sort of floating currency of charms and cures, that requires no departure from usual practice. Portents, especially, require no special interpretation, though there are some few that may be almost considered private property, such as the supernatural appearances that precede the death of members of particular families. Many cures, too, are of general application. Should a child have the whooping-cough, for instance, there is no need of a special consultation with any authority upon the subject. Every old lady knows that it only requires to be taken out walking every day, till it meets a man on a piebald horse; or to be taken to a married couple, whose names are Joseph and Mary; or to be placed, with its face to the tail, on the cross that is always to be found on a donkey's back; or to have its breakfast of milk divided with a ferret: either of these cures will be efficacious. More serious complaints, of course, require sterner remedies. Epilectic fits call for a sacrifice: offended powers must be propitiated with the death of a cock, the spot on which the afflicted person fell when first seized being the altar indicated. The rite of sacrifice is, further, visibly interwoven with the ceremonial of many other charms. The impalement of snails on thorns for the charming away of warts is another case in point, as is the victimization of frogs by sticking them full of pins for magical purposes. In the north the "uncanny" trick of piercing a pigeon's heart with a quantity of pins, and burning it thus curiously studded, is believed by inquisitive lasses to reveal wonders. There is a remarkable confusion of idea in the minds of those resorting to such practices as to whether they are summoning to their aid good or bad powers. The difference, too, between an invocation and a prayer is not clearly recognised by young and crude minds, as we may realise in the following familiar lines which, seventy years ago, as a septuagenarian assured us, were said by many a child at its mother's knee as a prayer, nightly:—

> "Matthew, Mark, Luke, and John
> Bless the bed that I lie on.
> There are four corners to my bed,
> There are four angels round me spread,
> One to read and one to write,
> And two to guard me all this night.
> If I should sleep and never wake,
> I pray to God my soul to take."

And, again, in the rhyme in which Coleridge tells us the Christchurch boys used to invoke the aid of the Evangelists to assist in untying the knot they believed the devil was tying in their legs when they had the cramp. The same confusion of idea is apparent in the key and the Bible test, in which two persons place a key between the leaves of a Bible and expect both objects to turn round as a sign that the questions to which they sought replies were answered affirmatively; and in the selection of holidays for the performance or accomplishment of some other ceremonies. Thus one girl whispers to another, and has done so, we may presume, for centuries, "if you pluck a rose on Midsummer's-eve at midnight and put it away in a box till Christmas, and then wear it in your band or hair, some one will take it out who will be your husband, or bear the same name as that of your future spouse." Fridays, supposed to be unlucky from the fact of the crucifixion having taken place on one, are picked out as the only days on which some rites can be performed with any prospect of a result. This mystification is intensified in some counties by the interweaving of the sign of the cross as part of the occult ceremonies. In the midland counties we have heard of a cross being made at the foot of their beds by maidens with their shoes, who, getting into bed backwards, repeat the following charm on three successive Fridays:—

> "I have set my shoes in the shape of a T,
> Hoping my true love for to see
> In his apparel and his array,
> In his clothes he wears every day."

After which they may not break the charm by speaking till the next morning. This process is to enable them to dream of their future husbands, and bearing in mind the physiological fact that our brains, in some conditions, continue to pursue, in sleep, the objects that last occupied them when awake, it is probable that it was successful sufficiently often to create a confidence in its efficacy. In the southern counties we have heard of as much trouble taken, on three successive Friday evenings, to procure a visit from the unknown or tardy prospective partner. For this purpose the damsels throw a handful of salt into the fire at the same hour, week after week, with a form of incantation in verse, which sets forth that it is not the salt that the fire is to burn, but the heart of the young charmer's lover that it is to turn, so that he may be neither able to rest nor be happy till he pays her a visit. To procure a letter from a lover, it matters not on which day of the week, all the longing lady has to do is to turn her bed over nine times.

Some old people delight in this kind of lore. It is upon their lips all day long. Their quaint sayings and constant reminiscences of old times make their conversation like a cabinet of curiosities. They can meet every case with a cut-and-dried saying, cut and dried we know not when, we know not by whom. From the birth of an infant till it has "comed the length of a man," as the north-country peasant says, circumstances over which no one has any control indicate its destiny to these worthies. To begin with, the day of the week upon which it is born settles the leading features of temperament or fortune.

> "Monday's child is fair of face,
> Tuesday's child is full of grace;
> Wednesday's child is born to woe,
> Thursday's child has far to go;
> Friday's child is loving and giving,
> Saturday's child must work for its living."

In some parts of the kingdom the rhyme goes

on to say, that the child that is born on the Sabbath-day is blithe and bonny, good and gay; but in other parts these desirable characteristics are deemed the special property of those born on Christmas-day. If, in dressing, a garment should be accidentally put on wrong-side out, it is a sign of good luck; if his palm should itch it is a sign that he is about to receive money; if his nose should tingle, that he is going to be vexed or pleased, according to whether the titulation is most observable on the outside or inside of that organ; if his ears should burn, he may be sure some one is talking about him; if the sole of his foot should exhibit any irritation, he may make preparation for going to strange places; should he trip in running upstairs, a wedding may be expected; and should he shudder, some one is walking over the spot that is to be his grave. Should he forget anything, or have to turn back for it after leaving the house, he must sit down before starting afresh, or he will meet with bad luck. In some parts of the country it is deemed imperative that he should also eat and drink, to avert the evil his carelessness would otherwise draw upon him. If he should meet a squint-eyed person, he need not anticipate much profit from the undertaking in which he is engaged; for in this rude and illogical learning a squint-eye is an evil eye for others besides its unfortunate possessor. His own hands tell his own fortune, without any need of consultation with the palmister; for if there be specks upon his thumb-nails, he is going to receive a gift; if these marks appear upon his first finger-nail, he has a friend; if upon the second, a foe; if upon the third, a visit to pay; and upon the fourth, a journey to go.

The days of the week are arbitrarily lucky for the conduct of some business and unlucky for the prosecution of other. Nail-cutting on some days is a most hazardous proceeding; all sorts of misery culminate on the head of the rash mortal who presumes to cut them on the Sabbath-day,—"better for him he had never been born;" and to cut an infant's nails before it is a year old is a sure way to make it a thief. Sneezing indicates a great deal more than the development of a catarrh or cold in the head. In the matter of sternutation lip-lore has shaped the experience into this:—

"Sneeze on Monday, sneeze for danger;
Sneeze on Tuesday, kiss a stranger;
Sneeze on Wednesday, get a letter;
Sneeze on Thursday, something better;
Sneeze on Friday, sneeze for sorrow;
Saturday, see your true love to-morrow."

Another rhyme says,—

"Sneeze three times before you're up,
You'll see you're sweetheart before you sup."

Some household duties are regulated by a regard for old-world rules that some people could not bring themselves to infringe for any convenience. Washing-day is settled with almost as much solemnity as attended the adjustication of the proper recurrence of Easter, in the days of rivalry between the Celtic and Roman churches:—

"Those who wash on Monday have all the week to dry;
Those who wash on Tuesday will have one day gone by;
Those who wash on Wednesday wash in the middle of the week;
Those who wash on Thursday have all their clothes to seek;
Those who wash on Friday must truly wash at need;
Those who wash on Saturday must be sluts indeed."

It will be seen that it would be next to impossible for any rightly-disposed person to commence laundry operations later than Tuesday in the face of this statement. The working-classes of London have a hebdomadal nomenclature of their own: Black Monday, Miserable Tuesday, Dreadful Wednesday, Equal Thursday, Better Friday, Joyful Saturday, Glorious Sunday. Assistants in shops, especially, sympathise with these attributes and own their application. After their holiday on Sunday, a return to business on Monday morning may be felt as tedious. Tuesday and Wednesday drag on still shadowed by the contrast of past joys; but Thursday is midway between these and those in anticipation. Friday heralds the near approach of the Sunday holiday; and by Saturday anticipation has concreted into content. The Saturday half-holiday movement has, probably, dimmed the acuteness of this feeling, which, for all we know, may have been thus expressed by London 'prentices in the days of Queen Bess, or before. Portents do not disdain to indicate the approach of events in the homeliest forms. Our current lip-lore assigns different meanings to the cinder that flies out of the fire on to the hearth-rug, according to its shape. If it be roundish, it is a purse, and signifies the prospective receipt of money; if it be oblong, it is a coffin, and announces death; if it be hooded, or thicker at one end than the other, it is a cradle, and intimates the probability of an addition to the family circle. A film of soot, hanging to either of the bars of the fire-place, is called a stranger, and indicates the arrival of one; and, should the fire only burn on one side, the approach of a stranger is considered to account for the non-combustion of the rest of the fuel. Sparks are more definite: they point out that the strangers to be expected are enemies. A tallow-candle, every one knows, lets us know when we are about to receive a letter, and the expression of "a thief in the candle" applied to fiery excrescences on the wick, looks as though our forefathers relied upon the candle as a sort of burglar-detective, the transition from the security afforded by artificial light against midnight depredators to the object yielding that light being easy. Out of doors it is just the same: there is a meaning to many things where none might be expected; and nearly everything the eye rests upon is an omen of some sort. As is probably allowed, whether in jest or earnest, wherever the English tongue is spoken,—a crow, in the south, a magpie in the north,—means much more than a close inspection of those ornithological specimens would lead us to suspect: one crow is sorrow, two are mirth, three a wedding, and four a birth. Here the indicative powers of crows cease; but magpies continue the tale, five are heaven, six are hell, and seven "the de'il's own sell." Crows are accredited with a determination to soil the garments of such persons who do not put on some new garments on Easter Sunday. Should a dog howl, it is because he knows of bad news. Trees and herbs are both associated with this sort of domestic magic. The ash, for instance, has powers over witches and wizards; and lasses choose lovers by its aid:—

"An even ash I do confess,
But new pull'd from the tree;
The first young man that I shall meet
My own true love shall be."

Herbs have offices beyond those of healing. Sage, unassociated with onions, has a property as attractive as its flavour associated with that bulb is appetizing. A maiden can see her future husband if she likes to pull a leaf or two of it at midnight on Midsummer's-eve. Our rustic informant of this fact tried this charm some fifty years ago, and saw, as she left the garden for the house again, the young man she married walking across an adjoining field. Her curiosity brought none of the evil consequences that are supposed by some to accrue to charm-trying, for she and her husband are still living, and among their handsome progeny is to be counted one of the brave fellows who won the Victoria Cross and a commission, for chivalry in the field in the Crimea.

We have not touched upon the pageants still lingering in this century, nor upon curious local customs, nor related legends, nor described the ghosts, goblins, hobgoblins, fairies, brownies, elves, bogies, kelpies, and other supernatural beings that have sent so many little folks to bed trembling, and caused them to lie there shuddering with their faces covered with the bedclothes in so many lands, through so many centuries. Different countries have their special customs, their special supernatural beings, and local legends, most of which have found their way into niches of local literature. Goblins and hobgoblins, however, are citizens of the world, for we expect that if Göethe had described the beings he feared to see as he hurried out of bed in the old mansion at Frankfort to be frightened back into it again by his father, who waylaid him in the long dusky passages, with his dressing-gown turned inside out for the purpose, he would have painted them in similar outlines to those with which Sir Walter Scott would have depicted them at a similar age. We have simply shown our readers a few samples of the new curiosities antiquaries are now collecting, many of which have not been hitherto aught but lip-lore, and from which their industry and intelligence are likely to fashion into form and limn with vivid colours most interesting additions to our knowledge of the manner of the growth of the human mind.

CLAPHAM.—The chief stone of new Sunday-schools and lecture-hall has been laid at Grafton-square, Clapham. The entire cost of the structure is to be 2,800*l.*, of which 2,114*l.* have been paid or promised. Mr. J. Tarring is the architect, and Mr. Saunders the builder of the new hall.

ECCLESIASTICAL CELEBRATIONS AT ROME.

THE magnificent celebrations just brought to a close for the Centenary of St. Peter and canonizing of twenty-five new saints, might be considered from various points of view. It is not our part or desire here to enter upon any theological question or to estimate any one of the interests affecting the Roman Catholic cause in these proceedings that are said to have attracted a greater number of prelates and priests to that Church's metropolis than ever had been seen there. We have to confine ourselves to the purely artistic aspects, and the question as to the phase in the story and progress of sacred art, the claim to rank as arbiters of taste or style in things admitted within the sanctuary asserted for herself by Rome in the aggregate of costly displays, in the gallery of paintings (as we might call it, though ephemeral indeed), and in lavish apparatus prepared expressly for these days of solemnity in the St. Peter's and St. Paul's basilicas. In one respect, superior to what was seen in the former church, on occasion of the previous canonization (the 8th of June, 1862), the decorating of the same interior, in this last instance, profuse and gorgeous as it was, had one good feature,—that it adapted itself to, instead of in any part concealing, the architectural whole; and, amidst the multiplicity of silken hangings, painted banners, garlands, and gold lace, all the principal lines and masses in the vast basilica were left distinctly marked out. In the choice of colour, the prevalence of warm crimson and gold was happy, and the grace of pendant draperies was pleasing. The illumination, also tastefully designed, and marvellously diffused over every "coin of vantage," radiating from the colossal tiara and cross, suspended centrally above the nave, and from measureless heights where it might be supposed no human hand could reach, produced effect the finer inasmuch as it did not dispel the solemn twilight, but seemed, like countless gems, to shine amidst a rich gloom, that allowed to appear, but yielded not to, the lustre of lamps, tapers, chandeliers, and candelabra. The report that for this decoration alone had been spent 80,000 scudi, that each of the great candelabra of woodwork made to imitate marble had cost 500 scudi, and that the round sum of 100,000 scudi was the minimum required for the occasion within the walls of St. Peter's alone, need not have caused surprise to any spectator. But nothing better can we say of the gorgeous *ensemble* than that, seen by artificial light, with the almost total exclusion of that of day, it proved magical, mysterious in resplendence, harmonious in all its varieties of pomp. The details would not bear inspection; and, as seen by common light, the whole appeared theatrical, in many parts even tawdry and trivial. What could be more offensive, for instance, than *imitation sculpture*, namely, chiaro-scuro paintings on flat boards to represent colossal statues of saints in the upper file of arched niches, the lower of which (and the upper also to some extent), along naves and transepts, are occupied by the giant figures in marble of all founders and foundresses of religious orders? What could be more unsuitable than artificial flowers, in immense garlands and bouquets, which, with childish idea of bringing such details into accordance with the scale of architecture, were actually made *colossal* also, chalices and petals swelling into proportions ludicrously beyond nature! We might even forgive chiaro-scuro on flat surfaces, to imitate the inimitable, in comparison to the absurdity of painted cherubim, all blooming in fleshiness, and Valentine in style, supporting similarly painted garlands, alike flimsy in material, along the summit of cornices, behind interminable rows of tapers! As to the attempts at higher art, the colossal groups, illustrating the lives of the new saints, hung over each entrance within the atrium, and pendant on banners from each arch along the naves, sufficed merely to tell their stories with some effect from a distance, though exception might be made in favour of one, by Signor Grandi, presenting a miracle wrought by S. Paolo della Croce, founder of the Passionist Order. And the other great banners carried in the procession, displaying more conspicuous or ecstatic scenes in the careers of the same individuals, could not be said, at most, to attain any worthier object than the supply of so many imposing accessories, highly conducive, indeed, to the effect of that stately pageant as it slowly defiled through the array of troops with

the gleam of tapers lighted in every hand, the hundreds of mitres, and superb varieties of ecclesiastical costume—episcopal, cardinalitial, oriental. Graver objections than any we have made above might be urged against the introduction of the cross of St. Peter, instead of that by which a lost world was saved, as the grand luminous centre to all regards, pendent from the tiara and keys, that blazed like diamonds, all in glass, high above the arcades between vault and cornice. Nor could there, we thought, be a less dignified subject chosen to represent in picture the supremacy of St. Peter than the homage offered by the natives of all lands, in ideal grouping, through that ceremony of kissing the foot of the well-known bronze statue that stands in the same church, and was this day decked out in Papal robes,—such being the scene indifferently painted over the chief portal on the inner side. And this intent to refer the glories of the occasion to St. Peter, in the true spirit of Rome, however inadmissible by Protestants, was manifest in another accessory not suitable as entering into the decorative whole, the inscribing on gold ground along the entire extent of cornices, and in enormous letters distinct at that height, the full narrative of the mysterious discourse held by the Saviour, after His Resurrection, with that Apostle, while around the cupola was read in similar letters on gold the text in which such spiritual prerogatives are conferred on Peter by the Divine Master.

Turning to another art, we must report in the highest terms of praise the character and execution of the grand anthem "*Tu es Petrus*," &c. composed by Mustafa, the first soprano singer of the Sixtine Chapel, and performed at the offertory by three choirs, each of 100 voices, answering from extremities of the church in strains that seemed to float through and pervade its entire atmosphere, and in their alternations of exultant jubilee and sublime mournfulness, answered to our imagining of the song of angels more than any vocal music we have ever heard. A grand passage also was the *Te Deum*, in that part where wind instruments accompanied the fine old chant in which it is invariably sung at Italian worship; and the clarion strains at the elevation had the thrilling effect never to be forgotten by those who have attended the Papal high mass.

The choral music at the grand Vespers, when was repeated the same resplendent illumination at St. Peter's on this evening, would alone have sufficed to signalize the day among the *fasti* of Rome's religious observances. And with a "Girandola" on the Pincian Hill, more brilliant and varied even than the precedents of such fiery spectacles—the chief design intended to illustrate the triumphs of the Church over the five regions of earth (Australia included)—were closed the pomps of the 29th of June, 1867, destined to perpetual record for the sixty-second act of canonization performed by the Roman Pontiffs, perhaps in no preceding instance attended with circumstances more impressive.

The exposition of the chair of St. Peter, removed from its bronze case and colossal supporting statues, to be displayed for three days above a lateral altar, offered a study for the antiquary, and attracted crowds even amidst the ritual splendours of the 29th of June. Of dark stained wood, the seat made very deep, it has a high back terminating in a triangle, and adorned with round head open work; the front, below the seat, encrusted with ivory in eighteen small panels, on each of which is incised either an animal or some symbol not easily distinguished at the distance in which the relic was now seen.

From such description, it is apparent that the Roman tradition of this being an antique senatorial, or curule, chair, applied to Christian purposes for the use of St. Peter as an episcopal throne, is quite untenable,—if anything, the evidence of its details seeming to imply Byzantine rather than other origin.

For the decoration of St. Paul's, scene of the grand ceremonies on the 30th, the Pope, with all the cardinals and prelates attending, a better principle was adopted than at St. Peter's: scarce any draperies or hangings were admitted, but a profuse, and, indeed, tasteful illumination was dispersed along framework that followed in general the lines of architecture. As to the various popular fêtes and spectacles extending over eight days, and directed by the magistracy in honour of the great religious occasion, it may suffice to report that they were, as invariably the case with such things in Rome, brilliant, ingenious, and ably carried out; nor could anything have been finer in its kind than the displays of pyrotechny. The illumination of the Capitoline Museum claimed higher admiration in the sphere of calm and classic beauties. Though not introduced amidst ritual celebrations, the great picture painted for this occasion by Fracassini, to be placed in a hall of the Vatican among other illustrations of hagiography, and representing the deaths of the nineteen friars, monks, and secular priests who were hanged in a garret where they had sought refuge from Calvinistic persecution at Gorkum, all being among the individuals now raised to the honours of the altar,—this powerful art-work may here be noticed as the great success of the day in Rome, and as indeed asserting for Signor Fracassini, who is still young, a primordial rank in the local school; his affecting treatment of a painful subject having this high merit,—to say the least,—that it renders the horrors of the scene subordinate to, and subdued before, those higher attributes in which is announced the triumph of the immortal over the mortal, the victory of faith at life's direst trial. For some fortnight before the removal of this picture, the studio of its artist was daily thronged by visitors of all classes, attracted by all that fame had made known with no exaggerating tongue. As to the many other artists employed for the pictures at St. Peter's, and remunerated according to their standing, it would be useless to record their names.

Rome.

HEALTHFUL DWELLINGS CHARACTERISED BY CHEAPNESS.*

I HAVE stated that the best sanitary construction of a house, apart from any question of cost, would be on the principle of the Crystal Palace, only with thick slabs of opaque glass, and with double walls, inclosing (like double windows) a still air, which would be the best means of meeting external variations of heat and cold and preventing the evils of the absorption of moisture or of miasma. The chief novelty in construction in the Exhibition is in the model dwelling of the Co-operative Society of Paris, made by M. S. Ferrand, the architect, to some extent on the principle I have stated.

He constructs his walls of hollow brick in this, and makes the wall double; thus:—The thickness of the double wall is 5 in., which, of course, would be insufficient for bearing purposes. But the wall is held together, and the bearing power is obtained, on what I have termed the Crystal Palace principle, by iron columns, beams, and crosstrees.

He claims for this construction the advantages of walls which are thin, and which, therefore, save space, and yet are warmer, resist changes of temperature better, and are better non-conductors of sound than the common brick or stone bearing walls, and that at a lower cost.

Of the hollow-brick cottage constructions, with hollow-brick flat roofs as well as walls, in England, it is reported that, as anticipated, they are warmer in winter and cooler in summer than the common constructions; whilst of ancient hollow floors, that are warmed by hot air underneath them, it is declared that the warmth derived from their extended surface is more comfortable than that derived from any other mode of house-warming.

M. Ferrand has an extended application of these double walls as a means of equalizing temperature. He opens the space between the two hollow walls into the cave or cellar beneath the ground-floor, from which the air circulates between the walls. The air of the cave being cooler in summer and warmer in winter in extremes of temperature than the outer air, this inner structure of air serves to maintain an equable temperature in the interior hollow wall and in the wall surface of the room. The principle of construction has been applied in hospital huts in hot climates, as reported, successfully. The hollow of the double wall is also applied as a means of producing a current of air for interior ventilation, the success of which in M. Ferrand's construction I had no means of getting tested.†

Of the superior quality of the wall itself, or its advantage as a non-conductor of heat and of sound, of its economy of space, and of the general advantage of this iron-tied construction, there can be no doubt. If it were of our common brick construction, the expense of a dwelling of the same size, constructed in the cheapest manner, would not be less than 150*l*. I have an estimate from Mr. Samuel Sharp, the architect to whom I am indebted for assistance in the drawings and the technical points of this report, that, on a large scale, the improved iron-tied double-wall, detached dwelling might be constructed in England for 110*l*. Moreover, the substitution of the 5-in. wall for the common brick 14-in. cottage wall would ensure a gain of 710 cubic feet of space, which, as such space is now allotted in cottages, would serve as breathing space for two people.

Instead of facing the interior wall with soft plaster and paper, it might be faced with a light-coloured Scott's cement, in which case, at no great expense, the wall would be washable, and its sanitary quality would be nearly as perfect as if it were faced with an improved and smooth tile surface.

On the whole, this construction is eminently worthy of consideration as being an advance in the principle of construction, and as affording the best promise of any in the Exhibition in connexion with the sanitary improvement of the dwellings of the general population.

Besides the sanitary improvement of the impermeable and washable interior glazed brick-wall of the model cottage of 1851, there are other long-tried and proved improvements in construction in England, which, nevertheless, have not got into extended use. There are various practical reasons for this. In the first place, they are little known to individuals, and the common builders only attend to general demands; and any improvements requiring new forms which need care or study in alterations and adaptations for which there is no general demand can only be executed at increased expense to the first individual who adopts them. The common builder has rarely any interest in change, and is usually prejudiced against them, as requiring a change of habits in construction.

Besides these trade obstacles to amendment, there have been experienced serious obstacles from the trades unions to improved constructions of hollow brick. If the hollow brick be made of the usual size, the gain is chiefly in the quality of the brick, and there is little advantage in the price of the manufacture. But there is much gain if the cubic contents be enlarged; and a plan and estimate of a cottage, which I directed to be prepared for the Prince Consort, was submitted to the late Mr. Thomas Cubitt, the eminent builder and contractor, with walls of hollow brick, each of the size of twelve of the common bricks, and the 9-in. wall set in cement, costing 3s. the superficial yard, against 4s. 6d. and 5s. for the common brick wall set in mortar; the whole cottage, with improved qualities and washable walls, costing 25 per cent. less than the common brick construction. The contractor admitted the correctness of the estimates, but he declined to adopt the new construction, and gave to me his reasons, to this effect:—"If I adopt that new and large form of brick, which requires the use of both hands to set it, my men will strike, and I shall have all the labour of overcoming resistance; and when I have done it, and shown how much more cheaply the construction may be made, others will follow me, and I shall have no profit, and nothing but trouble and vexation for my labour. I will not, therefore, undertake it." In other instances of the introduction, not of hollow brick of new sizes, but of machine-made brick of the common size, but consolidated and improved by pressure, the trades unions, at the instance of the brick-makers, have combined to prevent them; and thus one section of the wages classes have been blindly led to oppose most important improvements in the dwellings and the health and comfort of the whole of the wage classes.

There is, however, one important material, of which extended adaptations from all parts of Europe are displayed in the Exhibition—namely, Portland cements, in various forms of concretes,—that appears to present great and earlier facility of individual use, with the least amount of skilled labour.

My attention was particularly directed by the late lamented Captain Fowke to concretes, as a means of advance in quality as well as economy in labouring-class dwellings. He used much of it in constructions connected with the South Kensington Museum. An inferior specimen of it is presented in a small entrance-lodge there. It is proved that with a proportion of from one-

* From Mr. Edwin Chadwick's Report. See p. 513, *ante*.

† *Vide* for plans, Army Sanitary Commissioners' Report on the Improvement of the Sanitary Condition of Barracks and Hospitals.

fifth to one-eighth of Portland cement to sand, gravel, or small stone a wall may be made one-third stronger than common brickwork; or with concrete a wall may be made of equal strength with one-third the thickness of common brickwork, and of equal thickness, about one half the price. The common brick absorbs about 20 per cent. of water. The concrete wal does not absorb one quarter that quantity, and takes about a quarter that time in drying, and when made of the harder stone, and properly set, it may be said to be impermeable to wet. In the French Exhibition of building materials there is a very interesting collection of specimens of concrete from Vicat's cement (which is nearly the same as Portland), with table tops for wine taverns, of polished stone, held together, like mosaic work, by the cement; as well as stone for foot and road pavement, and blocks for walls. In the North German department, from the manufactory at Bonn, there are large tiles made of Portland cement, with coloured concrete facings, worth examining; as also some very good sculptured casts and objects of external decoration. But the chief development of the application of cement to concrete constructions is made by M. Coignet, who, by machinery, crushes stone into as fine a sand and powder as he can get it, and mixes the materials of lime and cement, and by pressure produces specimens of enormous strength; when powdered granite or porphyry is used, of strength approaching to that of the original stone. In the annexe near the pond in the direction of the Pont de Jena, there is a school-house constructed by him, with statues of granite, porphyry, and other objects, specimens of the material. These various specimens go to prove that, if objects with the qualities of hard stone are required, it will be more economical to break the stone into pieces and recast it in moulds with cement than to carve it. One of the most important specimens is the flat concrete roof and its wide span, proving the possibility of making the ceilings and roofs of houses as with one large slab of stone. The principle of construction established by these concretes is that everything is made, as it were, a monolith. A church at Vesinet, near Paris, is made of the Béton Coignet, and the steeple may be said to be a monolith. In inferior constructions this is of importance, as cisterns and large water-tanks are made of it, as in one piece, without the insecurity of numerous mere common mortar-joints. The proportions of the common beton, or concrete, were—of river-sand of good quality, 5 cubic mètres; hydraulic lime, slaked in powder, 1 cubic mètre; heavy Paris cement (considered equal to Portland cement), 250 kilogrammes. In 1848 I got some trial works made for the use of concrete for public drainage and sewerage work. I do not know what cement was used; but, as cements were at that time less understood, probably the wrong sort was used, for the report was unfavourable. Subsequently large quantities of Portland cement have been used for the Thames Embankment; and Mr. John Grant, the engineer in charge of the works on the south side of the river, has made very extensive trials, stated in an interesting paper, to be found in the Transactions of the Institution of Engineers of London, which establish the great strength of the material. The chief engineers of the city of Paris informed me that they have used large quantities of the Béton Coignet for sewers, for which, on account of its monolithic principle and evenness of surface, it is very advantageous; and that they are using it in the construction of bridges, and are well satisfied with it. I did not ascertain the various costs of production, but the price charged for this more finely manipulated concrete is less than for stone, though I did not perceive that in the class of dwellings in question it would have any material advantage in price over common brick; in sanitary qualities, however, it would have very great advantage indeed. It was averred that houses constructed of it, instead of being unsafe to occupy within a year, would be very safe to occupy within little more than a month.

But the Emperor has, on the advice of Mr. W. E. Newton, the English engineer, adopted for the forty new dwellings of which I have already spoken concrete construction, which will remedy almost entirely the common default of damp walls of the first set of buildings erected by him, and give him the advantage over all the model dwellings in the Exhibition in economy and quality of wall construction, except as to quality in the double hollow walls of the co-operative association.

The new wall construction is of Portland cement, one-eighth of cement to the gravel, sand, and stones to be got from the stratum of the foundations, and may be made without bricklayers or masons, and with common labour. Various forms of concrete walls—the cob-walls and flins in Devonshire—are of old date; but there has been one inconvenience in their construction, that deep troughs, or inclosed cases of the height of one story, were necessary; but for the Emperor's new dwellings there was used a movable case, invented by Mr. Joseph Tall, with which the walls may be constructed very quickly to any height, with considerable gain in time. With one-eighth of Portland cement the cost of this construction in England is generally about one-half the price of brickwork; and as in small dwellings, with much division-walling, nearly two-thirds of the entire cost of construction is in brickwork, this economy of half upon two-thirds is a very important gain, constituting often a turning-point of commercial advantage. Where improved model dwellings now yield 5½ per cent. as the average of the later buildings in the metropolis do, there is a great convenience of the concrete walling for distant places, in this respect, that, inasmuch as the cement is only about one-eighth the weight of the mass of brickwork, there is only about one-eighth the cost of carriage, where brick is not to be had on the spot, and where there is loose stone, sand, and gravel, or clay that may be burned, and where there is common unskilled labour available. By putting in cylinders of zinc, and lining them with cement as the walls are carried up, and when completed, taking them out, round and smooth chimneys, and water-spouts, and ventilation and warming flues may be formed readily, cheaply, and exactly. In respect to air-flues and spouting, the concrete construction appears to have the advantage over any of the other constructions that I found in the Exhibition, and to be readily available for much sanitary improvement. The concrete renders skirting-boards—those great harbours for vermin—unnecessary, and it runs all round the door and the window-frames, and therefore no filleting round them is required. The ceilings and roofs are made with concrete, for which Colonel Scott, R.E., has invented a very economical iron framing. Of this concrete construction of ceilings and roofs, as well as of walls and stairs, there is little but the doors and window-frames to burn, and they may be said to be fireproof.

The colour of the concrete wall of Portland cement is that of the darker stucco colour of houses in London, or of brown paper; which, however passable it may be for exterior surfaces, leaves improvement necessary in lightness and cheerfulness, even if the inner surface of the concrete wall be smooth. Colonel Scott, who succeeded Captain Fowke at the South Kensington Museum, and who has conducted extensive experiments on cements (stated in the Transactions of the Royal Engineers), and is deemed a leading authority on the subject, has invented one cement, which appears to be the desideratum for cheap wall-facing. It is a species of artificial gypsum, of a light warm colour, or of a light lime colour. When properly laid on, it is even better than Parian facings. It is hard, impermeable to wet, and it is, above all, washable. It has already been introduced for the lining of hospital wards, as possessing the requisite qualities. The expense of a facing with this cement, if properly used, is about two-thirds the expense of the ordinary three-coat work.

On the question of comparative economy of the concrete walling and the brick walling, it is assumed that the two walls are of equal thickness; but in the plans of model dwellings originally presented to the Prince Consort a construction was proposed on the panel or buttress principle, to economise material as well as space, the bearing power being supplied by the buttresses; and this may be given by 9-in. walling, with concrete, or in appropriate forms of hollow brick; and 4-in. or 5-in. walling of the right materials may serve for the necessary protection against the weather. 4½-in. walls of properly-made hard hollow brick are proved to be better protection against weather in times of frost than 9-in. or 14-in. common brick or soft stone.

In the English exhibition of materials there is a new species of walling, invented by Mr. B. Nicoll, of London, which presents very great advantage in non-absorbency of moisture, in non-conduction of heat, in having a washable internal facing, in saving space as against common brickwork, and being lower in price. Over a framework of strong cross wires, of about an eighth of an inch thick, there is woven by a powerful machine a mass of straw or fibrous matter, which is saturated with a solution which renders it fireproof. It is then subjected to very powerful pressure. A coating of light Scott's cement mixed with Parian cement is then put upon it for inside facing, and of Portland cement for the outside facing. The surfaces are impermeable to moisture, smooth and washable with water, so as to save the expense of repeated lime-washings. It is formed into slabs in iron frames, which are put together and closely and securely fastened with bolts. The slabs are from 1½ in. to 4 in. thick. These slabs serve as superior panelling for dividing walls and partitions. Where space is of importance it has the advantage, perhaps, over concrete walling, in enabling a wall to be made of not more than 1½ in. or 2 in. in thickness, and yet its quality deadens sound. It has also great advantages for weatherproof roofing superior to slate or tile, though not, as I conceive, superior to well-made hollow brick (when it can be got), tied together with iron ties and covered with layers of asphalte and cement. In the Prince Consort's model the principle of the flat roof was adopted, but none of the model dwellings in the Exhibition have attained to that principle.

Where ground-space is dear, as it is with dwellings of the labouring classes in town, there is good reason for utilising the roof-space. It serves as an additional drying-ground. In dry weather it may be used for the children to play on. One example has been set in London, where in a densely-crowded neighbourhood, there being no playground for a boys' school, they have made one for them on the flat roof. If any one will look over the city *ouvrières* of Mulhouse, it will be seen what a large amount of roof-space is lost; and yet the cost of the weather-tight flat roof of concrete or hollow brick is nearly a third less in England than the timber, slate, or tile roof. Its greatest convenience or use, however, would be for self-contained dwellings; on them the father of the family may sit in fine weather, and have better air and an extended prospect, and enjoy himself in the Oriental fashion.

In respect to theeconomy of these improved constructions, there can be no doubt that fully 24 per cent. of saving is attainable, either on the hollow-brick principle, on the simple concrete principle, or on the Nicoll wall principle of construction. Mr. Samuel Sharp has made a very close estimate of a four-tenemented dwelling, on the principle of construction of the Prince Consort's model dwelling. At the present prices in England such a dwelling could not be constructed of brick for less than 400*l*., or 100*l*. each separate dwelling. On the concrete principle of construction, with Nicoll dividing walls, it might be constructed for 300*l*., or 75*l*. each dwelling, minus the cost of land. Apart, however, from the superiority in quality, the improved dwellings would have a gain of cubic space. The cost of the chief dwellings and the space in them is as follows:—

	Total cubic space.	Cost per cubic foot.
The Mulhouse dwellings	9,625	3
The Workmen of Paris ditto	5,950	5½
The Co-operatives of Paris ditto ...	7,480	4
Model dwellings (concrete), with washable interior walls, on the Prince Consort's principle of flat roofs	4,800	3

THE NEW DISCOVERIES IN ACOUSTICS.*

THAT the acoustical force is closely corelated, and strictly analogous, to the other forces connected with material substructure, and especially to the electric, as has before been noted in the *Builder*, and to the elastic and cohesive forces, as well as probably to the diamagnetic and magnetic; and that the acoustical force is subject to laws strictly analogous to those even of light and heat, although its semi-mechanical nature shows its still closer affinity to the forces first referred to,—all this is now becoming more and more apparent. Professor Tyndall has of late been much engaged in this special field of scientific research, and his discoveries are likely to lead to important progress towards a clearing up of those perplexing mysteries in respect to acoustics in the design and construction of churches and halls which so often trouble and

* "Sound: A Course of Eight Lectures, delivered at the Royal Institution of Great Britain." By John Tyndall, LL.D., F.R.S. London: Longmans, Green, & Co. 1867

disappoint the architect. Meantime, however, the science is in a very immature state in such respects as these, but the results already attained are both curious and instructive. We have more than once given particulars from Dr. Tyndall's lectures, while they were in course of delivery, and especially as to sensitive flames, or the influence of the sounds of articulate speech upon gas jets; and we propose here to give some further details, as to both singing and sensitive flames, and as to the laws and conclusions already deduced from these and other researches on acoustical vibrations.

Friction, remarks Dr. Tyndall, is always rhythmic. When we pass a resined bow across a string, the tension of the string secures the perfect rhythm of the friction. When we pass the wetted finger round the edge of a glass, the breaking up of the friction into rhythmic pulses expresses itself in music. Savart's experiments prove the friction of a liquid against the sides of an orifice through which it passes, to be competent to produce musical sounds. Let a tube be filled with water, its extremity being closed by a plate of brass, which is pierced by a circular orifice of a diameter equal to the thickness of the plate. Removing a little peg which stops the orifice, the water issues from it, and as it sinks in the tube a musical note of great sweetness issues from the liquid column. This note is due to the intermittent flow of the liquid through the orifice, by which the whole column above it is thrown into vibration. The tendency to this effect shows itself when tea is poured from a teapot, in the circular ripples that cover the falling liquid. The same intermittence is observed in the black dense smoke which rolls in rhythmic rings from the funnel of a steamer. The unpleasant noise of uncoiled machinery is also a declaration of the fact that the friction is not uniform, but is due to the alternate "bite" and release of the rubbing surfaces.

Where gases are concerned friction is of the same intermittent character. A rifle bullet sings in its passage through the air, while to the rubbing of the wind against the boles and branches of the trees are to be ascribed the "waterfall tones" of an agitated pine-wood. Pass a steadily-burning candle rapidly through the air; an indented band of light, declaring intermittence, is the consequence, while the almost musical sound which accompanies the appearance of this band is the audible expression of the rhythm. On the other hand, if you blow gently against a candle flame, the fluttering noise announces a rhythmic action. When a gas flame is simply enclosed within a tube, the passage of the air over it is usually sufficient to produce the necessary rhythmic action, so as to cause the flame to burst spontaneously into song. Not all, however, are aware of the intensity to which this flame-music may rise.

In speaking of his researches as to singing flames, Dr. Tyndall says:—

"While executing these experiments I once noticed that, on raising my voice to the proper pitch, a flame which had been burning silently in its tube began to sing. The song was interrupted, and the proper note sounded several times in succession. In every case the flame responded by starting into song. The same observation had, without my knowledge, been made a short time previously by Count Schaffgotsch. Observe the conditions of the experiment. I place a tube 12 in. long over this flame, which occupies a position within the tube about 1¼ in. from its lower end. When the proper note is sounded the flame trembles, but it does not sing. I lower the tube so that the flame shall be 3 in. from its lower end: it bursts spontaneously into song. Now, between these two positions there is a third, at which, if the flame be placed, it will burn silently; but if it be excited by the voice it will sing, and continue to sing.

In this position, then, it is able to sing, but it requires a start. It is, as it were, on the brink of a precipice, but it requires to be pushed over. I place the flame in this position: it is silent; but on the sounding of the proper note it stretches forth its little tongue, and begins its song. By placing my finger for an instant on the end of the tube I stop the music; and now, standing as far from the flame as this room will allow me, I command the flame to sing. It obeys immediately. I turn my back towards it and repeat the experiment. My body does not shade the flame. The sonorous pulses run round me, reach the tube, and call forth the song. A pitch-pipe, or any other instrument which yields a note of the proper height, produces the same effect.

When a silent flame capable of being excited is looked at in a moving mirror, it produces there a continuous band of light. Nothing can be more beautiful than the sudden breaking up of this band into a string of richly luminous pearls at the instant the voice is pitched to the proper note."

While treating of sensitive naked flames the doctor described some extraordinary phenomena.

"The most marvellous flame hitherto discovered," he remarks, "is now before you. It issues from the single orifice of a steatite burner, and reaches a height of 24 in. The slightest tap on a distant anvil reduces its height to 7 in. When I shake this bunch of keys the flame is violently agitated, and emits a loud roar. The dropping of a sixpence into a hand already containing coin, at a distance of 20 yards, knocks the flame down. I cannot walk across the floor without agitating the flame. The creaking of my boots sets it in violent commotion. The crumpling or tearing of a bit of paper, or the rustle of a silk dress, does the same. It is startled by the patter of a raindrop. I hold a watch near the flame: nobody hears its ticks; but you all see their effect upon the flame. At every tick it falls. The winding up of a watch also produces tumult. The twitter of a distant sparrow shakes the flame down; the note of a cricket would do the same. From a distance of 30 yards I have chirruped to this flame, and caused it to fall and roar. I repeat a passage from Spenser:—

'Her ivory forehead, full of bounty brave,
Like a broad table did itself dispread;
For Love, his lofty triumphs to engrave,
And write the battles of his great godhead.
All truth and goodness might therein be read,
For there their dwelling was, and when she spake,
Sweet words, like dropping honey she did shed;
And through the pearls and rubies softly brake
A silver sound, which heavenly music seem'd to make.'

The flame picks out certain sounds from my utterance; it notices some by the slightest nod; to others it bows more distinctly; to some its obeisance is very profound, while to many sounds it turns an entirely deaf ear.

On chirruping to it, or on shaking a bunch of keys within a few yards of it, great part of the flame is suddenly abolished. The light at the same time is practically destroyed, a pale and almost non-luminous residue of it alone remaining.

We have called this the 'vowel flame,' because the different vowel sounds affect it differently. These sounds differ from each other through the admixture of higher tones with the fundamental one. It is to these tones, and not to the fundamental one, that our flame is sensitive. I utter a loud and sonorous U, the flame remains steady; I change the sound to O, the flame quivers; I sound E, and now the flame is strongly affected. I utter the words *boot*, *boat*, and *beat* in succession. To the first there is no response; to the second the flame starts; but by the third it is thrown into greater commotion; the sound *Ah!* is still more powerful. Did we not know the constitution of vowel sounds, this deportment would be an insoluble enigma. As it is, however, the flame is a demonstrator of the theory of vowel sounds. It is most sensitive to sounds of high pitch; hence we should infer that the sound *Ah!* contains higher notes than the sound E; that E contains higher notes than O; and O higher notes than U. I need not say that this agrees perfectly with the analysis of Helmholtz.

This flame is peculiarly sensitive to the utterance of the letter S. If the most distant person in the room were to favour me with a 'hiss,' the flame would instantly sympathise with him. A hiss contains the elements that most forcibly affect this flame. The gas issues from its burner with a hiss, and an external sound of this character is therefore exceedingly effective.

Finally, I place this musical box upon the table, and permit it to play. The flame behaves like a sentient creature; bowing slightly to some tones, but courtesying deeply to others."

It is not to the flame, as such, that these effects are ascribed. Effects substantially similar are produced when jets of unignited coal-gas, carbonic acid, hydrogen, or air are employed. These jets may be rendered visible by smoke, and the smoke jets show a sensitiveness to sonorous vibrations even greater than that of the flames.

When a brilliant sensitive flame illuminates an otherwise dark room, in which a suitable bell is caused to strike, a series of periodic quenchings of the light by the sound occurs. Every stroke of the bell is accompanied by a momentary darkening of the room.

Savart's experiments on the influence of sonorous vibrations on jets of water belong to the same class of effects. This subject is treated of in the lectures.

In experimenting on the law of vibratory motions and the theory of beats, a curious experiment with a small brass table or mounted disc on which the hands are laid, reminding one of the spirit-knocking process, is thus described:—

"We are now prepared for a very instructive experiment which we owe to M. Lissajous. I divide this brass disc into six vibrating sectors; and bringing the palm of my hand near any one of the sectors, I intercept its vibrations. The sound is augmented. Placing my two hands over two *adjacent* sectors, you notice no increase of the sound. Placing them, however, over *alternate* sectors, a striking augmentation of the sound is the consequence. By simply lowering and raising my two hands, I produce these marked variations of intensity. By the approach of my hands I intercept the vibrations of the two sectors; their interference right and left being thus abolished, the remaining sectors sound more loudly. Passing my single hand to and fro along the surface, you also hear a rise and fall of the sound. It rises when my hand is over a vibrating sector; it falls when the hand is over a nodal line. Thus, by sacrificing a portion of the vibrations, we make the residue more effectual. Experiments similar to these may be made with light and radiant heat. If of two beams of the former, which destroy each other by interference, one be removed, light takes the place of darkness; and if of two interfering beams of the latter one be intercepted, heat takes the place of cold."

The following summary of the lecture just referred to will show in what way light upon acoustical difficulties may be looked for hereafter, when the subject has been a little farther investigated:—

"When several systems of waves proceeding from distinct centres of disturbance pass through water or air, the motion of every particle is the algebraic sum of the several motions impressed upon it.

In the case of water, when the crests of one system of waves coincide with the crests of another system, higher waves will be the result of the coalescence of the two systems. But when the crests of one system coincide with the sinuses, or furrows, of the other systems, the two systems, in whole or in part, destroy each other.

This mutual destruction of two systems of waves is called *interference*.

The same remarks apply to sonorous waves. If in two systems of sonorous waves condensation coincides with condensation, and rarefaction with rarefaction, the sound produced by such coincidence is louder than that produced by either system taken singly. But if the condensations of the one system coincide with the rarefactions of the other, a destruction, total or partial, of both systems is the consequence.

Thus, when two organ-pipes of the same pitch are placed near each other on the same wind-chest and thrown into vibration, they so influence each other, that as the air enters the embrochure of the one it quits that of the other. At the moment, therefore, the one pipe produces a condensation the other produces a rarefaction. The sounds of two such pipes mutually destroy each other.

When two musical sounds of nearly the same pitch are sounded together the flow of the sound is disturbed by *beats*.

These beats are due to the alternate coincidence and interference of the two systems of sonorous waves. If the two sounds be of the same intensity their coincidence produces a sound of four times the intensity of either; while their interference produces absolute silence.

The effect, then, of two such sounds in combination, is a series of shocks, which we have called 'beats,' separated from each other by a series of 'pauses.'

The rate at which the beats succeed each other is equal to the difference between the two rates of vibration.

When a bell or disc sounds, the vibrations on opposite sides of the same nodal line partially neutralise each other; when a tuning-fork sounds the vibrations of its two prongs in part neutralise each other. By cutting off a portion of the vibrations in these cases the sound may be intensified.

When a luminous beam, reflected on to a screen from two tuning-forks producing beats, is acted upon by the vibrations of both, the intermittence of the sound is announced by the alternate lengthening and shortening of the band of light upon the screen.

The law of the superposition of vibrations above enunciated is strictly true only when the amplitudes are exceedingly small. When the disturbance of the air by a sounding body is so violent that the law no longer holds good, secondary waves are formed which correspond to the harmonic tones of the sounding body.

When two tones are rendered so intense as to exceed the limits of the law of superposition, their secondary waves combine to produce *resultant tones*.

Resultant tones are of two kinds: the one class corresponding to rates of vibration equal to the difference of the rates of the two primaries; the other class corresponding to rates of vibration equal to the sum of the two primaries. The former are called *difference tones*, the latter *summation tones*."

We hope to hear more, shortly, of Dr. Tyndall's curious researches. The volume under notice is an exceedingly interesting one.

THE JUNIOR CARLTON CLUB-HOUSE, PALL-MALL.

IN consequence of the large number of candidates waiting for admission to the Carlton and Conservative Clubs, it was thought desirable to establish a new club, and at a meeting held in the year 1864 at the Carlton Club-house a committee was appointed to carry out that object.

Several offers of properties in Pall-mall, St. James's-street, Regent-street, and Piccadilly were made in answer to advertisements, and eventually a site in Pall-mall was decided upon, on account of its eligibility with reference to the Houses of Parliament, and from the fact of its being entirely freehold.

Considerable difficulty and delay were experienced in purchasing the interests of the several tenants, but that was accomplished in the course of last year, when the new club-house, of which we illustrate the front in Pall-mall, was commenced by Messrs. Lucas, Brothers, who had obtained the contract in a limited competition.

It will be seen from the plans that there will be two frontages, one in Pall-Mall, and the other in St. James's-square.

The rooms of the club-house are arranged as follows:—

On the ground-floor is an entrance-hall, 27 ft. by 23 ft. 6 in.; a reception-room, 29 ft. 6 in. by 20 ft. 6 in.; a morning-room, 89 ft. by 27 ft.; a smoking-room, 28 ft. by 29 ft. 6 in.; and a principal staircase, 30 ft. by 23 ft.

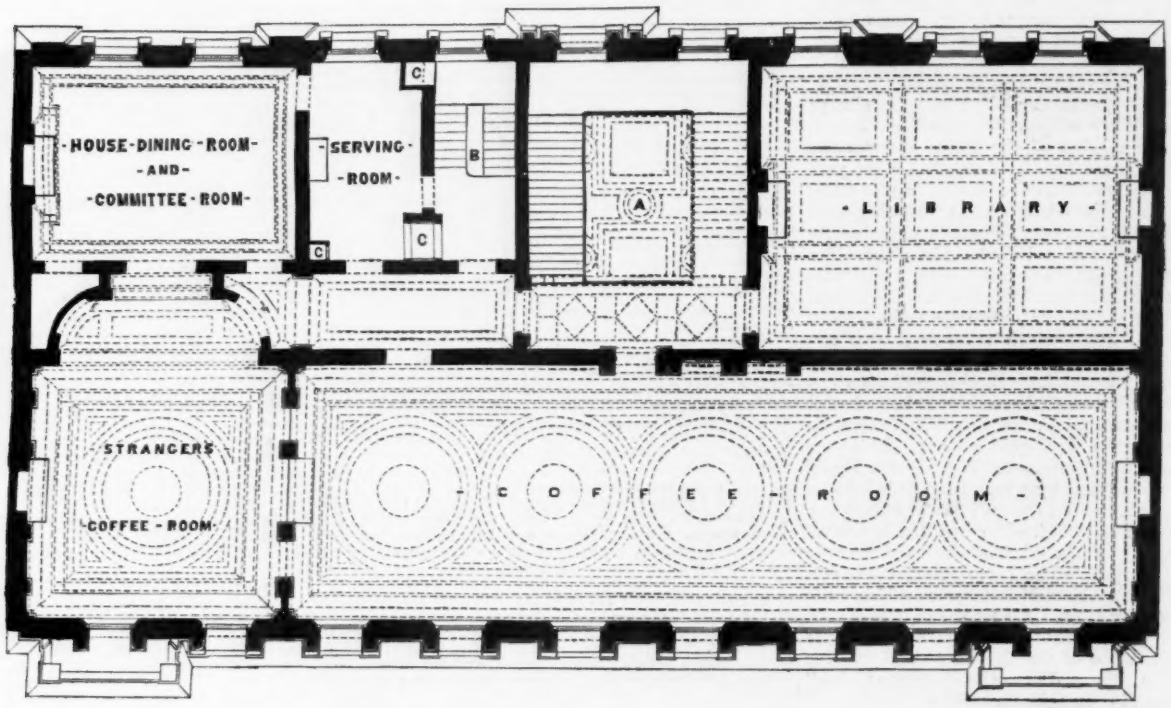
There is also a second staircase, and serving and attendants' rooms, and an entrance in St. James's-square for members who have bedrooms.

On the first-floor is a members' coffee-room, 90 ft. by 27 ft., divided by a plate-glass screen from a strangers' coffee-room, 27 ft. by 27 ft.; a house dining-room, 28 ft. by 20 ft. 6 in.; and a library, 40 ft. by 29 ft. 6 in. There is another serving-room on this floor.

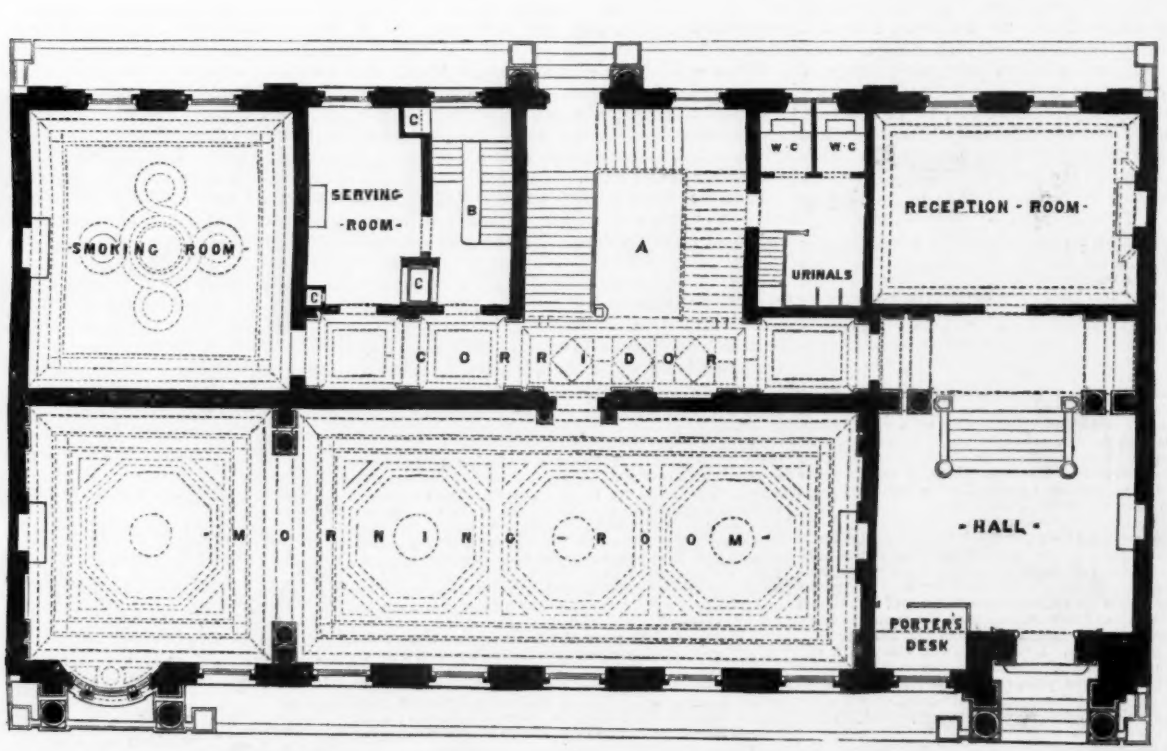
The heights of these stories are respectively 20 ft., except where the mezzanine occurs on the north side, in which are lavatories, attendants' room, &c.

On the second floor are two billiard-rooms, one being 27 ft. 6 in. by 27 ft., the other 29 ft. by 21 ft., the secretary's offices and bed-room, and a second smoking-room for visitors. The

THE JUNIOR CARLTON CLUB-HOUSE.



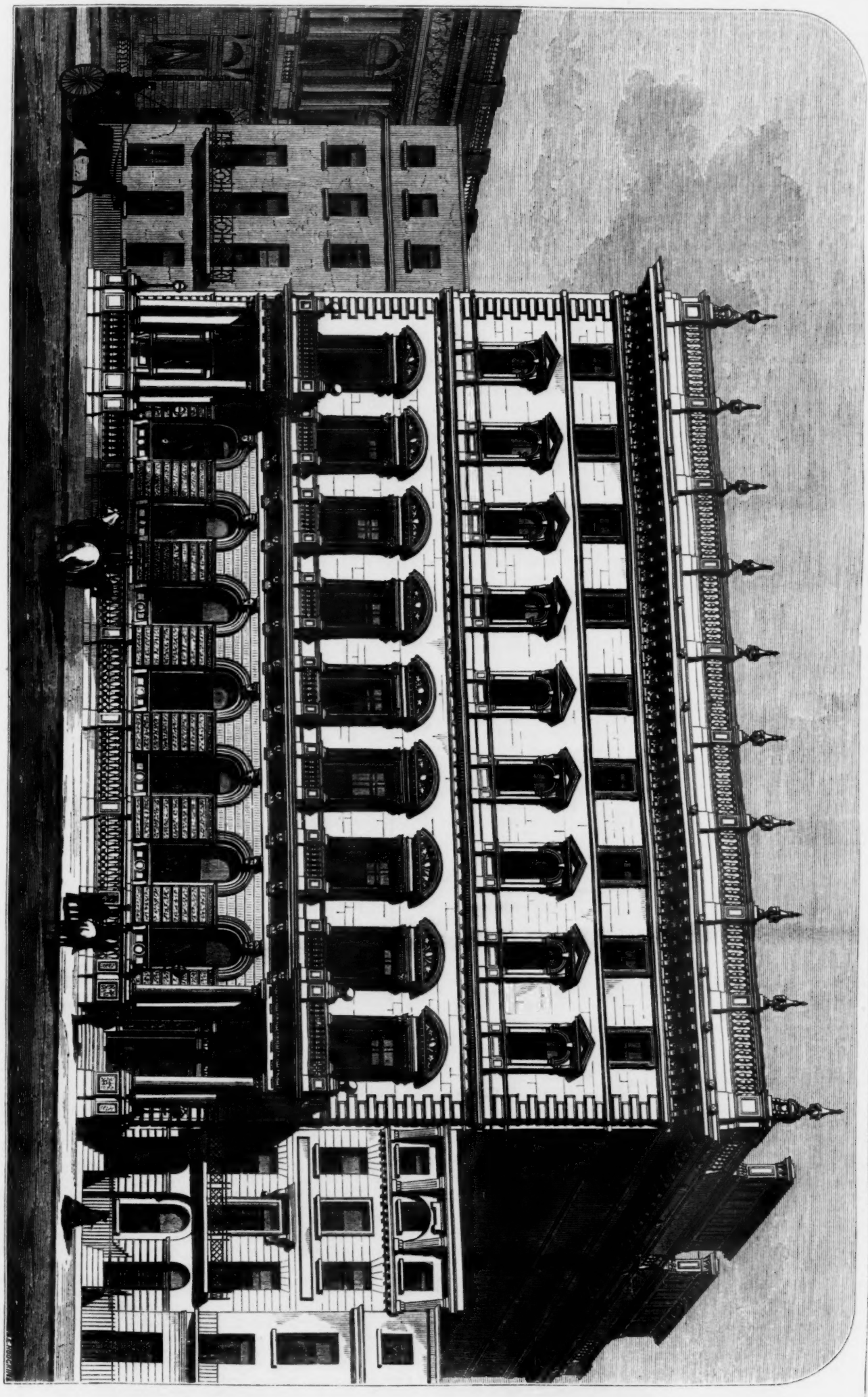
- FIRST - FLOOR - PLAN -



A - PRINCIPAL - STAIRCASE -
B - SECOND - STAIRCASE -
C - LIFTS -

- GROUND - FLOOR - PLAN -

X V 0 X XX XXX XL L LX LXXFEET



THE JUNIOR CARLTON CLUB-HOUSE, PALL MALL.—MR. DAVID BRANDON, ARCHITECT.

remainder of this floor and the floor above are occupied by eighteen bed-rooms, which will be let to the members of the club.

Attendants' rooms, water-closets, &c., are provided on each of these floors.

The topmost story is intended to provide accommodation for about fifty male and female servants.

Under the ground-floor and above the basement a mezzanine story is formed, having six dressing and bath rooms, with separate corridor and staircase; also the steward's office, still-room, housekeeper's room, and stores.

In the basement are arranged the kitchen, 40 ft. by 29 ft., and the scullery, 25 ft. by 17 ft., which are continued up to the ground-floor, giving a height of 19 ft.; a servants' hall, butler's pantry, plate-closet, kitchen, clerk's office, cook's room, kitchen-maid's room, larders, steward's room, wine-cellar, and dispensing cellar. Outside, in the vaults under the pavement in St. James's-square, are beer and house-coal cellars, fish and vegetable larders, and sand and charcoal stores.

On the Pall-mall front are coal, coke, and wood stores, an ice-well, and rooms for cleaning clothes, boots, and knives, also a washing place.

There will be three hydraulic lifts for dinners, wine, coals, and so on.

The club now consists of 1,500 members, exclusive of peers, members of Parliament, and members of the Carlton Club, who were entitled to be immediately balloted for, making together a total of 1,680, and they at present temporarily occupy the premises in Regent-street belonging to the late Parthenon Club.

The new club-house was designed by Mr. David Brandon, architect, under whose able direction the works are being done. The cost of the building will be about 40,000*l.*, exclusive of decoration and furniture.

RATS.

MR. MECHI writes as follows on this subject, important to others besides farmers:—

Has any one ever estimated the number of rats that prey upon the farmer's property? Allowing one to each acre, we should then have about 60 millions in the United Kingdom. As animals consume according to their weight, a full-grown rat would consume much grain in a year. But, unfortunately, it is not only what they consume, but what they destroy, that concerns us. Said an old labourer's wife to me, "A rat has taken away in one night eight of my brood of young ducks, worth 8d. a piece. My neighbour, Mrs. B——, a small farmer's widow, cannot raise any poultry, for under her house is a honeycomb of rats' runs. She took them in a hamper into her sleeping room last night, and even there they tried to get them out."

I can testify to their destructive powers from experience. When they have young they will carry away and store up scores of young chickens, ducks, or turkeys in a single night, much the same as a cat having kittens. A friend of mine who had a little rabbit warren opposite his windows, saw his cat catch a young rabbit. He followed her, and found that she already had laid up thirty-six that morning near her kittens. I have known of a brace of foxes taking thirty-seven turkeys in a single night, and burying many of them up in some dung-heaps which were upon an adjoining field ready for spreading.

When hard pressed for food for themselves or their young, rats are very daring, and will attack large chickens and good-sized rabbits. I know a case where a youth was awoke in the night by a rat beginning upon his ear. Wherever stock are fed with meal or grain there the rats will surely come, to share, with the pigs especially, their barley-meal and pollard.

When dining at Vintners' Hall with the late excellent Mr. Green, the great shipowner, he said to me:—"Mr. Mechi, I can beat you in pigs: I make a thousand a year by my pigs." I expressed my surprise, and said if I got their manure free of cost I thought myself a lucky fellow. "Well," said he, "I have only sixty pigs; before I kept these pigs the rats used to damage the sails of my ships to the extent of a thousand a year, eating every greasy portion. They now dine with or after the pigs, and never touch the sails." This hint may be useful to shipowners as well as to housekeepers, who find that the mice destroy the greased or stained portions of table-cloths.

Rats migrate, and travel a long way in a night, in search of food. A neighbour of mine told me that he one night met a small army of them, some hundreds together. The carelessness of some farmers or their false economy causes serious loss to their neighbours. They may be called rat-preservers or rat-breeders. I used to pass frequently by two wheat-stacks which were completely honey-combed by the rats, whose paths into and up the stacks were visible from the road. Having consumed nearly all the grain, they left the stacks for better quarters. When thrashed there was plenty of straw, but the corn was nearly "*nil*." Those who keep their corn in stacks for seven years (and I know of some who do so) had need have an eye to the rats. I have used a dozen iron stack-frames (Garrett's patent) for the last twenty years, without any rats. The fact is, they cannot do without water, so if one gets into the stack he must come down to drink, and cannot re-ascend. It is too common a practice to leave carts, ladders, or anything close to the stacks, thus affording access. As soon as these are removed, Mr. Rat must come down for water and cannot return. We always trim or shave our stacks (cost 1s. per stack) to cut off access from below, as well as for economy of corn and neatness.

Mice are more difficult to expel than rats, for they get into the sheaves at harvest time and are thus carried on to the stack. Unless poisoned by liquid immediately after putting up the stack they soon find out that they can exist by the 12 per cent. of water contained in straw and 11 per cent. in the grain. They also learn to avail themselves of dew and rain. In the spring and summer they will so multiply as to destroy or damage a large quantity of the grain, especially if left over-year. To show how animals can exist by the water contained in what is called dry grain and its straw, I will relate the case of a horse at Cressing Temple, a few miles from me, where a horse used for treading or consolidating the barley in the barn, being left there all night, slipped down between the closely packed barley and the boarded sides of the barn. In vain was search made for him in the morning, and it was concluded that he had been stolen. On Christmas Day, as the ploughmen came to attend to their horses, they heard the neighing of a horse in the barn, and after removing the barley, they found the lost horse as fat and as sleek as a mole. Thinking he must be very thirsty, they ignorantly allowed him to go to the pond and drink his fill, and in consequence he died. This is well known to many persons now living. The horse had gradually eaten his way into a comfortable space. But to return to our rats. They are most industrious and destructive burrowers: as they cannot destroy a solid brick wall they will burrow under it, unless the foundation is well concreted; where beams enter the wall they will gnaw the wood. It requires a watchful eye to keep them under. Every hole should be noted, and plugged at once with a piece of tile or brick fixed with cement or a piece of hard wood dipped in gas-tar. Their runs should be tarred, and thus they will soon get disgusted with their quarters. Wherever a small heap of earth is thrown up near a wall, the run should be traced and at once stopped: lime and stone as a concrete conquers them. Loose lime they cannot work in, it blinds and disgusts them. In every barn and shed door there should be a round hole, about 8 in. in diameter, so that the cats can have free access in search of the rats. It is at night they work, and they do so as much as possible under cover. They may be easily poisoned by strychnine, mixed with ground barley or oats; but before trying this they must be fed for several nights with the meal unmixed with poison. Rats are very sagacious, and had I space I could relate many instances of their cunning. It is a most dangerous thing to spread poison on bread and butter, for they carry it away; and I know of too many instances where valuable dogs, fowls, &c., have perished. Another inconvenience is, that when poisoned they die in their burrows, which are too frequently under your drawing or dining room, or in the walls. Their decomposition causes a most detestable and too durable stench. There is nothing like plenty of cats. I find male cats, castrated when young, by far the best rat-catchers; and by blocking the holes you give the cats a better chance of catching them. Traps may also be set; but they are very wary of them. Hollow walls are objectionable, so is thatch on buildings.

Water rats undermined the banks of my pond until I turned in a few pike, which soon converted rats into fish. A pike of 3 lb. will take a rat and swallow him at once. Beware of pike where you have young ducks, for they enjoy them quite as much as they do rats. I had imagined that there was a chance of the rat biting the stomach of Mr. Pike; but, as an old angler, and examining the condition of the pike's stomach with a bait in it, I found that there is no fear of that, for instantly the stomach collapses like an elastic pitch-plaster, and not a single breath could the rat or any living thing draw. Pike always swallow their prey alive, and head foremost. They are very fond of eels, and swallow them alive and head foremost. They always seize their prey across the middle, and, unless very hungry, hold them so for some time.

Rats find abundant accommodation and concealment under the old-fashioned wooden barn floors and dilapidated or thatched farm buildings. The modern system of asphalting upon concrete is an effectual barrier: they cannot gnaw it; their only chance is to burrow under between the ground and the concrete, and this, by a careful examination, may be easily prevented. A very destructive cunning old rat, that could never be trapped, was taken in the following manner:—Every hole except one was carefully stopped with gas-tar substances, and the trap set at the remaining hole. For two days and nights he declined coming out, but hunger and thirst at last compelled him to face the trap, and he was taken.

I very much commend asphalted floors to my agricultural brethren. It is so cheap and clean, and, above all, prevents any damage to corn, &c., by preventing damp arising from the earth beneath it. Cats such as I have will not only kill rats, but also weazels. The latter will destroy a brood of poultry in a night, if they have access to them. Of course every one knows the value of ferrets and a good rat-dog.

THE PACIFIC RAILWAY.

THE progress made by the construction parties who are laying down the track of the Union Pacific Railway appears to be something unprecedented. An explanation of the actual process of construction is furnished by a correspondent of the *Cincinnati Gazette*, who has recently been with the senatorial excursion party from Omaha to the western terminus of the road. He says:—

"There is little really known by the people of the character of the enterprise. Most think that a company of capitalists are hastily putting down a rude track, over which cars can be moved with care, for the purpose of securing lands and money from the Government. The fact is, one of the most complete roads of which the country can boast, with equipments that surpass many, is being laid with a speed that fails to impress the nation, simply because it is not believed. But let the facts tell their plain yet wonderful story. General J. S. and D. C. Casement, of Ohio, grade the road, lay the track, and put up the telegraph. The graders go first. There are 2,000 of them. Their advance is near the Beach Hills. They protect themselves, and are digging the fortification which makes the future sure for us, on through Indian battle-fields, while the daily fight goes on. . . . . Let the reader picture the scene. The rush of the loaded truck; the successive dropping of the rails in place; the rattle of the spiker's hammer, sounding like a hotly-contested skirmish; the roar of the distant supply trains moving up; the resounding of the frequent signals near at hand; the universal bustle; 'the rumble and grumble and roar' of the wonderful advance. Let the elements of the savage warfare and the actual presence of hostile Sioux along the bluffs be woven into the picture, and together it forms one that the world has not seen before, and which the stories of magic can scarcely equal."

On the 9th of May, 1866, but forty miles of road were completed. In 182 working days thereafter 245 additional miles were laid and put in prime condition, every rail and tie and spike having been brought up from the rear. Seven saw-mills furnish the ties and lumber. All bridges are framed, the pieces numbered, and set up where wanted without the least delay. Unless driven off by Indians, which, the correspondent says, does not now seem probable, the road will touch the base of the Rocky Mountains in the coming autumn. The California end has already reached a point about a hundred miles east, and is descending the eastern slope of the Sierra Nevadas into the Valley of the Humboldt. It is confidently expected that Salt Lake will be reached next year, and that 1870 will see the whole line completed. While the nation has scarcely heard of what has been done, the work has been nearly one-third accomplished. What about the Indians when the work is finished?

THE PRODUCER, THE MIDDLEMAN, AND THE CONSUMER.

THE great question whether the producers of wealth and its consumers cannot bargain with each other directly, for their mutual benefit, without the intervention of the overgrown middleman, who, for merely handing over goods from the producer to the consumer, takes enormous slices out of everything, and gets fat upon that which he neither produces nor consumes in this great "nation of shopkeepers," is likely to take a prominent place henceforth in the annals of England. A new foe to economical arrangements has started up in the self-interested objections of a by no means philanthropic "Howard" to deal with co-operative consumers without the intervention of the middleman drone, who is most certainly destined to be ultimately ejected from the busy hive of industry, but who in the meantime serves the purpose of the short-sighted producer, who depends on him for touting his goods to their mutual benefit, but at the great cost of the consumer; not perceiving, perhaps, that what such a trade combination must lead to is the rapid substitution of co-operative producers themselves, who will deal with the co-operative consumers without the intervention either of the middleman or the self-centred producer for whom he touts. The question has now been taken up by a limited co-operative agricultural and horticultural association, whose council comprises influential names such as those of the Right Hon. William Cowper, M.P., Thomas Hughes, M.P., and others also well known. In an attempt to deal with Messrs. James & Frederick Howard, agricultural implement manufacturers, for their implements, at cash prices, they find, to their surprise no doubt, that Messrs. Howard decline to deal with them, because retail customers are to be supplied with their implements on trade terms, as they "feel bound to protect the interest of those upon whose exertions their trade in great measure depends"—in the meantime. And they have largely advertised their resolution amongst the aforesaid middlemen,—with what sort of motives may be readily conceived. We should not wonder to hear of a powerful co-operative agricultural implement manufacturing company or two being planted down in Messrs. Howard's neighbourhood some of these days, and circulars distributed by Messrs. Howard amongst an increasing number of co-operative agricultural implement-consuming farmers beseeching them for "custom."

THE SWANSEA WATER-WORKS.

THIS undertaking is now completed, and the final report of the chief engineer, Mr. Rawlinson, was shortly to be presented to the local Board of Health. The New Water-works Committee, accompanied by the surveyor, Mr. E. Cousins, the contractor, Mr. W. Williams, and other gentlemen, paid an official visit to the works, and inspected them prior to their being formally handed over to the town from the hands of the engineer and contractor. The work was carried out by the contractor, under the supervision of Mr. Unsworth, the resident engineer. The conduit and the conduit-pipes were first commenced in April, 1862, and the conduit and pipes were completed in the autumn of 1863, and the water began to be supplied from the new works at that time. The new reservoir works were commenced in April, 1862, and therefore but little apparent progress was made; and in May last the water for the first time was up to the finished overflow of the reservoir, and the whole of the embankments were found to be able to sustain the pressure thus thrown upon them without sign of weakness. The puddled wall of the embankment at its greatest depth is 98 ft. deep, and the main bank at its greatest depth is 80 ft. The top bank-line is a little over 600 feet long, and there are about 140,000 cube yards of material in the bank. The bottom bank width is nearly 500 ft., and the top bank width is 12 ft., and is finished 6 ft. above the lip of the by-wash, having a 4 ft. bank water-wall on the top, so that there is a protection of about 10 ft. above the highest line to which the water rises. The greatest depth of water against the bank is 76 ft., and the available depth from which the water is drawn at the bottom of the culvert is 64 ft., so that the volume of water at command when the reservoir is full is 300 millions of gallons. The surface area of the new reservoir is 32½ statute acres. The conduit from the reservoir to Morriston is 7¾ miles long, and 2 ft. diameter earthenware pipes, having a uniform fall of 5 ft. per mile, excepting at the two valley crossings where the water is conveyed by cast-iron syphon-pipes. These conduit-pipes are capable of delivering no less than four million gallons of water within the 24 hours, equal to 30 gallons per head for 150,000 persons, so that should the reservoir be enlarged at any time, there would be no extra cost for conduit-pipes to supply the immense volume of water stated. The present daily consumption is about two millions of gallons to the town, and about one million for compensation water to the various mills, &c.

THE PALESTINE EXPLORATION FUND.

AT the last meeting of the General Committee of the Palestine Exploration Fund, in the Jerusalem Chamber, Westminster, Mr. George Grove, the honorary secretary to the fund, read the report, from which we learn that at Jerusalem a discovery had been made outside the south wall of the sacred enclosure (Haram-esh-Shereef)—viz., that the live rock of the hill overlooking the Kedron was no less than 53 ft. below the present surface. The great south wall of the Haram had been traced down to that depth at the corner, making it in all 130 ft. high. In addition, the east wall of the Haram had been found to run on beyond the present south wall; and a second south wall had been discovered, 20 ft. distant from that already known. These discoveries were the most important that had been made in that part since the finding of the well-known arch by Dr. Robinson, and of the northern arch by Captain Wilson; and they were also interesting as showing what a great amount of unknown topography is probably hidden under the immense mass of *débris* which covers the hills and valleys of the Holy City. In the valley separating Moriah from the traditional Zion, opposite Dr. Robinson's arch, foundations of piers and other works had been found at a great depth. At the northern extremity of the town, close to the Damascus Gate, foundations of massive walls and of a tower had been uncovered. All these works are being prosecuted by Mr. Warren with energy. It had been the wish of the committee to procure a firman authorizing investigations inside the sacred enclosure; and Lord Stanley had been good enough to endeavour to obtain this; but on the arrival of the letter at Jerusalem it had been found to exclude all sanctuaries. The committee for forming a Biblical Museum reported that they had arranged to locate the museum at South Kensington, and to open it in the early part of next year. The committee will seek an interview with the Sultan during his visit to London. Their purpose is to engage the sympathy of the rulers of Syria in the object of the society, as being non-political and non-sectarian.

THE CRYSTAL PALACE.

THE appearance of the "Palace" on Tuesday, when (lighted up for the second part of the concert, and filled with 27,000 listeners) the Sultan and H. R. H. the Prince of Wales made their appearance in the Royal box, was very grand indeed, and will not be forgotten for some time by those who were present. There were other "mental photographs" received that will not soon fade. The orchestra itself was a brilliant feature; and that graceful proscenium containing the boxes in which sat his Sultanic Majesty and suite (not a new erection) is one of the best pieces of *architecture de circonstance*, if we may use the phrase, employed in the building. Appealing to another sense, the characteristic Turkish Ode was striking, and the prayer "To thee, Great Lord," from "Moses in Egypt," was grand in the extreme. The fireworks, too, so far as we could see them, were effective; but with these mismanagement greatly interfered. Looking at the building in the daylight, it would seem to be a difficult task to prevent persons in it from seeing what was going on in the gardens, but this the managers, nevertheless, effected with remarkable success on the occasion in question. Persons who wished to obtain tickets for the galleries rushed to and fro unavailingly, while vexatious barriers threw difficulties in the way of egress to the grounds. The display of fireworks, for which alone many persons had come, was commenced before half the visitors had got into the gardens or found places within; and hundreds, we should probably not be wrong if we said thousands, were surging about inside seeking direction of some sort and finding it not, till all was over; while in the gardens matters were made worse by the stupidity and utter selfishness of many of the visitors themselves. In short, a magnificent *mélange* was mightily marred by miserable mismanagement.

THE SULTAN AT THE ITALIAN OPERA HOUSE.

THE Floral Hall formed a charming vestibule to the Opera-house on the night of the Sultan and Prince's visit (the 15th), festooned with red and white roses, hung with muslin and cloth, well lighted with chandeliers and jets, carpeted in the centre, and lined on each side with lovely flowers and well-dressed people, who for a "brief happiness," as one little lady with three very large daughters expressed it, had paid a guinea a-piece to see the *cortége* pass into the house. And yet not so brief, either. The recollection of such incidents lasts. Many times will it afford a topic for conversation: often in after-life will it be referred to as a bright and remarkable moment. The group was a brilliant one when formed: our genial Prince of Wales all smiles and kindness; the Sultan, no longer apathetic, briskly saluting all the way down the hall; the Ulema, in green, and some of the other officers literally in gold.

The Royal Box was fitted up in the centre of the house (as it has been seen before), extending from above the pit-tier of boxes to the parapet of the amphitheatre. The house was crowded, with the exception of the "gallery," where the two topmost rows of seats remained untenanted all the evening.

The opera, *Massaniello*, was listened to with the greatest attention, and the duet at the commencement of the second act, capitally sung by Naudin and Graziani, was vociferously redemanded, and was again given with increased effect. Many of the Sultan's suite divided their attention between the house and the stage; and no wonder,—such a flower-garden as was presented by the stalls, which on this occasion included even the three rows of seats that now ordinarily represent the "pit," has been seldom seen. Extravagance in dress, by the way, is greatly on the increase, and it is to be lamented. Mr. Frederick Gye may take the credit of having arranged one of the great successes of this remarkable week.

BARS AND GATES IN LONDON.

THE parochial authorities of St. Pancras and St. George, Hanover-square, have recently been discussing with much interest the subject of the increasing traffic of their streets, and the inadequacy of their present available thoroughfares. The Victoria railway station, disgorging daily some thousands of passengers in cabs and other conveyances, has greatly increased the traffic of the district; but owing to some thoroughfares being blocked up by "bars and gates" the traffic is sent all over the district by circuitous routes. In St. Pancras the case is still worse. That parish contains the termini of the London and North Western and the Great Northern railways, to which will shortly be added a third station by the Midland Railway Company. The number of these obstructive bars and gates in that parish alone are about thirty, and the traffic through the open streets, owing to that fact, is something astounding. Some portions of the district are perfect "quadrilaterals," defying the inroads of the traffic around them. In London the number of obstructions is close upon two hundred, but the quiet streets thus protected are cleansed, paved, and lighted at the general expense of the ratepayers of the district. It was expressed at the last meeting of the St. Pancras vestry that the inhabitants of these quiet thoroughfares ought to pave, cleanse, and light their own streets in return for the privileges they now enjoy at the expense of their neighbours. It was also stated at the vestry that Lord Belmore's Committee on London Traffic had declined to take evidence respecting bars and gates, though strongly urged to do so. With regard to Regent-street traffic, the vestry of St. James's, Westminster, intend to discuss, at their next meeting, the advisability of planting trees on "both sides" of the street.

THE GUARDS' INSTITUTE.

THIS building, as a place of occupation, resort, and recreation for soldiers when out of barracks, has been erected on a site in Francis-street, Vauxhall Bridge-road. It is in the Veneto-Italian style, and consists of a basement and three stories. A flight of steps leads to the entrance-hall on the ground floor: on the right is a coffee-room for the privates, and on the left a billiard-room and coffee-room for non-commissioned officers. On the first floor is a reading-room and a billiard-room for privates, and a reading-room for the non-commissioned officers. The second floor is wholly devoted to the lecture and concert room, which is 100 ft. in length and 50 ft. in breadth, its height being from the floor to the open roof, which is constructed in an ornamental style in varnished deal, 28 ft. It was designed by Mr. H. A. Darbishire, and executed by Messrs. Smith & Co., of Pimlico, under the immediate supervision of Mr. James Cradock.

The Duke of Cambridge, when formally opening the building, the other day, said that the benefits of the Institution were not to be confined to the men of the Guards, but were open to every soldier in London. There are already no less than 920 subscribers.

LEAKAGE OF RESERVOIRS AT TUNBRIDGE.

AT a recent meeting of the local commissioners, a report by Mr. Bateman, C.E., was read, of which we give an abstract:—

"On Wednesday last I examined, as requested, the two service reservoirs recently constructed by you for the supply of water to the town and district of Tunbridge Wells.

I was informed that they each lost water at the rate of 20,000 gallons per day, when filled to a depth of 10 ft. or 12 ft. . . . .

The whole of the bottom of each reservoir is covered with a coating of Seyssel asphalte, which is also carried up the side walls and round the base of the internal piers to a height of about 1 ft. The asphalte is placed on a flooring of bricks, resting on concrete; and I am informed that no leakage whatever occurs in this portion of the work. The whole work, so far as I had the opportunity of examining it, appears to have been most carefully executed, and all the materials, too, have been of the best quality; and I am of opinion that no blame can attach to the contractor. I am also of opinion that the sole cause of the loss of water arises from the insufficient thickness of the side walls and the absence of water-tight material at their back.

The simplest and most effective cure in this case will be to line the inside of the reservoirs with asphalte, in the same manner as has already been adopted for the bottom and the foot of the side walls, taking such measures as the experience of the Seyssel Asphalte Company may suggest for securely attaching the asphalte to the vertical walls. Should it hereafter shell off or exhibit weakness for want of support, this will be easily remedied by building up an internal wall, about 14 in. thick, which will secure the asphalte in its place, and prevent it cracking or shelling off."

The Waterworks Committee reported, that in their opinion Mr. Bateman's proposal should be agreed to, and after some discussion it was resolved by the commissioners to adopt the report and authorize the committee to carry out Mr. Bateman's recommendation.

ARCHES.

THIS branch of construction deserves the most careful investigation, though it has already received so much attention from the ablest men that it were impossible, perhaps, to offer any idea entirely new concerning it.

In considering the very able article by Mr. Tompkins, let us make a number of voussoirs of Whiting to construct a semicircular arch of say 4 ft. space and 4 in. thick and place sufficient weight on the crown to break the arch: it will probably fly up near the 45th degree on either side, the lower arrises of the arch-joints being more pressed and crushed than any other part of the arch. In the arch constructed by Mr. Tompkins this could not occur; but for any great span and considerable rise his would require to be of a thickness incompatible with economy; and for arches of small span, excepting, perhaps, vaults, tunnels, and works of a like kind, the mode of construction is comparatively of little importance, as a few courses of bricks above the springing corbels the opening, and they carry no weight above that height.

If a construction were made to rise straightly from the abutments to the vertex, and sufficiently stiff to prevent bending, then the breaking weight at the vertex would be the weight sufficient to crush the transverse sectional area of such material when in that position; but a much less weight would break the material if placed midway between an abutment and the vertex: we should, therefore, heighten that point, so that it would bear as great a weight as the vertex, and which would in consequence bear much less. The points equidistant between those last operated on would require similar treatment, these again weakening the previous points and reducing their greatest load; but we must also consider the load that will be placed on such arches, as that will materially alter the construction; and for a bridge we must also allow for the greatest weight that will be placed on any point, in addition to what we allow extra for safety and for the jarring of vehicles.

If an arch be elliptical, a breaking-weight placed on the crown will cause it to give way at its haunches. To prevent this, thicken the arch at the haunches, gradually diminishing towards the crown, two courses being worked to butt against one, and in doing so, endeavouring to approach in each successive course a circular curve for the following course, of as great a radius as possible; bearing in mind that the less the saggitta the greater the strength of each segment, and that, unless the arch be uniformly loaded, the crown will carry the greatest weight, because it has the shortest length of voussoirs to press on, and, if these formed a straight line, would then resist as the sectional area of their material when in that position and operated on in that manner. But if they form a curved line, so that a string stretched on their face and attached to the extrados at springing and to the extrados at the crown, were to be at the narrowest place 1 in., then excepting the weight of the arch and friction, the breaking-weight would be equal to the resistance offered by the 1 in. left by string multiplied by width of arch; and if the string were carried beyond the crown to a point, and a breaking weight placed there, that weight would be less, because we should find the width left by string less than it was, consequently the sectional area less and weaker in proportion; therefore the crown is the strongest part.

H. AMBROSE.

SIR CHARLES BARRY AND THE LATE MR. PUGIN.

SIR,—My absence abroad prevented my seeing your impression of the 6th until to-day, or I should have replied last week.

I now beg to state, that the offensive manner in which I, amongst others, am alluded to,* leaves me no alternative but to write and say, that we are fully prepared to state facts, which will doubtlessly remove "the suspicions" you mention, and explain even the personal denials of Sir Charles Barry and my father, to which you refer.

E. WELBY PUGIN.

THE LAW COURTS COMPETITION.

SIR,—Having read the letter signed "A Surveyor," in your number of June 29, I beg you will allow me to say that I also have carefully measured the Courts in Mr. Waterhouse's design. I find them, however, exactly of the size prescribed, viz., 43 ft. by 32 ft. on the Common Law side of the building, exclusive of the recessed side-galleries given to many of the Courts, which would add 324 ft. superficial more, making in all 1,700 ft., instead of 1,024 ft. as represented.

The mistake of your correspondent has doubtless arisen from his having excluded from the area of the Courts that portion which is assigned to the general spectator facing the Judge. Mr. Waterhouse appears to have raised this portion of the Court above the general floor level to isolate it and give a better view from it; but the fact of its being so raised can be no more reason for its being excluded from the area of the Court altogether, than the fact that the raising of the Judges' Bench allows the introduction of another important passage can effect the diminution of the Court area to the extent of the space occupied by the Bench.

ANOTHER SURVEYOR.

*** The statement of "A Surveyor" agrees with that of Messrs. Shaw & Pownall. It is not "a mistake." The question seems to be, whether the corridor over which the Judges sit may or may not be measured into the area of the Court.

ARCHITECT AND BUILDER.

SIR,—The following is a list of the tenders sent in for new public-house at Chislett, Kent, for Messrs. Rigden & Delmar. Plans, &c., prepared by Mr. H. B. Wilson:—

Smith & Co.	£709	0	0
Groombridge	689	10	0
Wilson, H. B. (accepted!)	687	0	0
Cozens, Brothers	685	0	0
Adams	680	0	0

Query—Will the architect get a commission for superintending his own work? or will the employers be so much the gainers by combining the architect and builder in the same person?

A BUILDER.

* The observation was general, not particular.—ED.

HOW THE THAMES EMBANKMENTS ARE GETTING ON.

SIR,—The insertion of the inclosed may do good.

Contract No. 1.—North side of river, from Westminster Bridge to Somerset House:—

Total amount of contract	£520,000	0	0
Total done in labour, materials, and plant to end of June, 1867	386,189	0	0
Total unfinished at end of June, 1867	133,811	0	0
Total progress in June, 1867	7,555	0	0

Contract No. 2.—North side of river, from Somerset House to east end of Temple:—

Total amount of contract	£229,000	0	0
Total done in labour, materials, and plant to end of June, 1867	214,284	0	0
Total unfinished at end of June, 1867	14,716	0	0
Total progress in June, 1867	1,037	0	0

Contract No. 3.—North side of river, from east side of Temple to Blackfriars Bridge (not yet commenced):—

Total amount of lowest tender opened October 5, 1866 (dates of Acts, July 28, 1863, and July 29, 1864)	£239,000	0	0

Contract for Southern Embankment, Westminster Bridge to near Vauxhall Bridge:—

Total amount of contract	£309,000	0	0
Total done in labour, materials, and plant to end of June, 1867	105,000	0	0
Total unfinished at end of June, 1867	204,000	0	0
Total progress in this contract during June, 1867	2,000	0	0

JASPER.

CHURCH-BUILDING NEWS.

Witley.—The ancient church of Little Witley has been re-opened, after being entirely rebuilt at the sole expense of the Earl of Dudley. The chancel is built with a semicircular apse, in which there are five lancet windows, all filled with coloured glass, presented to the church by the rector's friends. The church is filled with encaustic tiles from Messrs. Godwin's works, Herefordshire. The pews are low and open, and the pulpit is of stone. Mr. Perkins was architect; Mr. Wall, of Hanley Castle, the builder.

Birmingham.—The parish of St. Thomas is to have a new church, which has been long talked of. Messrs. Abraham and George Dixon have promised a donation of 1,000*l.*, and the rector is making an earnest appeal to his parishioners and townsmen. The new church will be called the Church of St. Asaph, and is proposed to be erected upon a triangular plot of land at the junction of Latimer-street with Great Colmore-street. The site being limited, the whole has been made use of, and consequently the plan varies from the usual arrangement. The church will comprise a nave (86 ft. long) of six bays, divided from the aisles by an arcade of lofty piers and arches. The piers will be of Bath stone with enriched capitals, and the arches of parti-coloured stone. Above the arcade will be a clearstory, pierced with windows filled in with geometrical tracery. Eastward of the nave a broad arch will open into the chancel; the east end will be polygonal in shape, and lighted with seven lofty windows. The aisles will follow the shape of the land, and will widen gradually from the east to the west. All the roofs will be open, and boarded underneath the slates. Galleries being a necessity, the church has been designed specially to receive them. They will be constructed in the aisles, and at the west end, the position being marked externally by a transom and tracery across the centre of the aisle windows. All the passages will be paved with tiles; those in the chancel with encaustic. The seats will be of pine, without doors, and stained and varnished. The vestry will be formed underneath the chancel, and approached by a stone staircase. Externally the structure will be of best bricks, with dressings of Bath stone, moulded, and blue bricks will be freely introduced. On the Colmore-street elevation will be placed the tower and spire, 160 ft. in height, the ground-floor of the tower forming the principal entrance. There will be seats for about 1,000 persons. The design, selected in a limited competition, was prepared by Mr. Yeoville Thomason. The contractors are Messrs. Wilson & Son, of Handsworth. The cost will be between 6,000*l.* and 7,000*l.*

Dickleburgh.—The church of All Saints, Dickleburgh, is one among the many in Norfolk and Suffolk which have recently undergone restoration and repairs. Mr. R. M. Phipson, of Norwich and Ipswich, architect, was engaged to prepare plans and specifications of the contemplated restoration. These being submitted for

competition, several tenders were sent in, the selection being, for the woodwork, Mr. Bishop, Diss; and for the stonework, Messrs. Wells & Son, Dickleburgh. The stonework of the south windows is entirely new, the design being copied from the original. They are filled with cathedral glass by Mr. W. Cousens, of Norwich. The north wall has been pointed and repaired, and the old plaster taken off. A new buttress of Bath stone now occupies the place of the three old ones taken down. The chancel doorway has been completely restored with Ancaster stone, and has carved bosses to receive hood-moulds, one representing the vine and the other the oak. The interior repairs include a reading-desk in carved oak. The pulpit has been cleaned and repaired, but is both ancient and ugly. The benches are new, of English oak, with carved ends of various designs. The old carved oak screen separating the nave from the chancel has been lowered, so as to show the carved heads of the chancel benches. The east window remains in a dilapidated and almost unsafe state, and requires complete repair to harmonise with the rest of the church.

Lowestoft.—The churchwardens called a public meeting in the Town-hall to appoint a committee to assist them in carrying out the necessary repairs of the parish church. The meeting resolved that immediate steps should be taken, by appointing a committee to assist the churchwardens in raising the necessary ways and means for carrying out the repairs of the church with as little delay as possible. They also appointed a committee to assist the churchwardens in carrying out the repairs of the south aisle of the church.

Books Received.

Studies for the Restoration of the Plans of the Sacred Edifices of the Bible. By C. JONES. Part I. London: Trübner & Co. 1867.

THE author claims to have made important discoveries, and says this Part is issued with the view of determining whether or not he shall publish them. He further says it was written because it had been objected to his previous works that they told nothing and afforded nothing to criticise. We have looked through the present *brochure* with every desire to discover something useful in it, but have failed to do so, and are forced to admit that if the previous works told less, the objectors were right. Six quarto plates and a number of pages of letter-press are devoted to setting forth the only point touched in the Part before us, namely, what might have been the form of the stones of Solomon's Temple *if* it were built with stones fitted or dove-tailed together; and as there is no foundation whatever for the belief that they were dove-tailed together, the inquiry seems to be altogether unnecessary and valueless, even from the writer's point of view, that things are made obscure in the Bible in order to teach its readers to think. Mr. Jones ends with the following:—"Note.—Lest any should puzzle themselves attempting to restore the plans of the temple by aid of the foregoing, I may as well caution my readers that they would probably fail." We have not the slightest doubt about it.

Illustrations of Mediæval Antiquities in the County of Durham. From Sketches and Measured Drawings, by JOHN TAVENOR PERRY, and CHARLES HENMAN, jun. Oxford and London: James Parker & Co. 1867.

WE have here fifty-one large folio plates, illustrating some of the architectural treasures possessed by the County of Durham: St. Andrew, Auckland; St. Cuthbert, Billingham; St. Paul, Jarrow; SS. Mary and Cuthbert, Chester-le-Street; St. Lawrence, Pillington; Holy Cross, Ryton, and others, but more especially Finchale Priory, and St. Hilda, Hartlepool. Of the last there are twelve plates, and of Finchale fourteen. These are very carefully drawn, more so, indeed, than some of the remainder, and include a large number of valuable mouldings and other details.

In the brief sketch of the architectural history of Durham that precedes the plates, the authors say that one year after the death of Bishop Pudsey (which is fixed at 1195), "his son Henry commenced the building of the Priory Church at Finchale." Very little, however, of what is now seen can be the design of that early period.

Bishop Pudsey, we may note, had been the means of greatly helping forward the cause of art, for not only did he cover the diocese with important buildings, but by the decoration of shrines, and by the addition to the convent library of beautifully illuminated MSS., he made us his debtors.

The volume is exceedingly creditable to the industry, energy, and skill of Mr. Perry and Mr. Henman, and augurs well for the future of a professional career commenced so auspiciously. It is appropriately dedicated to the Duke of Cleveland, as president of the congress held in Durham by the British Archæological Association in 1866.

The coloured paper cover,—cleverly arranged, by the way, by Mr. Perry,—is numbered as Plate 1; so that, unless it be bound up with the rest, the volume will seem imperfect.

History of the Anglo-Saxons. By FRAS. PALGRAVE, F.R.S. A new edition, illustrated. London: W. Tegg, 1867.

A CHEAP popular edition of the late Sir Fras. Palgrave's "History of the Anglo-Saxons" has been published. It is "illustrated," but would be all the better if two-thirds of the engravings had been left out. They are rude and inexact; and, moreover, including, without explanation, views of buildings belonging to periods long after that treated of, only serve to mislead. The reprint is, nevertheless, welcome.

Wages Table. By HENRY J. HALLETT, Assistant Surveyor, St. Marylebone. London: Harrison & Sons. 1867.

THIS table shows the amount for any number of hours from one to eighty, at per hour or day of ten hours, from 1d. to 1s. per hour. It is very clearly printed on a large card.

Inventors and Inventions. By HENRY DIRCKS, C.E. London: Spon, Charing Cross.

THIS is a subject with which the author shows that he is familiar, and the result is an instructive volume, on,—first, the philosophy of invention considered strictly in relation to ingenious contrivances tending to facilitate scientific operations, to extend manufacturing skill, or to originate new sources of industry; second, on the rights and wrongs of inventors, particularly as affected by the influence of patent monopoly, legally and politically examined; and third, on early inventors' inventories of secret inventions, employed from the thirteenth to the seventeenth century, in substitution of letters patent. The work is dedicated to Mr. Henry Bessemer.

VARIORUM.

SOME of our readers may be glad to know that the paper by Mr. Jas. Fergusson, F.R.S., "On the Study of Indian Architecture," read at the Society of Arts, with a report of the discussion that followed, has been published by Mr. Murray, in a separate form. A sketch map and a number of illustrations have been added.——In the current number of the *Fine Arts Quarterly Review*, Dr. Kinkel reviews Mr. Wornum's account of Hans Holbein in a manner not wholly complimentary. Mr. Ruland continues his "New History of Painting in Italy." Mr. Ashpitel, in a paper on Gothic Architecture in Spain, says,—"People talk of 'honest brickwork,' just as if a brick, after all, was really nothing but factitious stone." We apprehend the sentence was intended to read,—"People talk of 'honest brickwork'; just as if a brick, after all, was really *anything* but factitious stone."——Messrs. Spon (Charing Cross) have published a catalogue of scientific books published or sold by them, which some of our readers would find useful.——"The Royal Guide to the London Charities, for 1867-8." By Herbert Fry. London: Hardwicke. The mere list of titles of the London charities, here given in alphabetical order, occupies no less than 167 pages, and we feel assured that no more remarkable memento of London could be given to our numerous foreign visitors and sightseers than this volume of the titles of its host of charities.——"A Handy Book to the Collection and Preparation of Freshwater and Marine Algæ, Diatoms, Desmids, Fungi, Lichens, Mosses, &c." By Johann Nave, translated and edited by the Rev. W. W. Spicer, M.A. London: Hardwicke. To all wishing to form a collection of algæ, &c., this small volume will be useful: it also gives instructions for the formation of an herbarium.——"Observations upon a New and Simple Process for the Preservation of Meat, Poultry, Fish, &c." London: Simpkin, Marshall, & Co. The object of this pamphlet is to recommend the patented process of Messrs. Medlock & Bailey, for dipping or moistening fresh meat with a solution of bisulphite of lime and common salt in order to preserve it from taint. They say that the bisulphite gives no taint or disagreeable flavour itself.——"London Cabs: the Course System as applied to London or any large City." By J. L. Haddan, C.E., of the Hackney Carriage Department of the Metropolitan Police. London: Stanford. Notwithstanding Mr. Haddan's experience, his proposal does not strike us as a satisfactory way to re-arrange the cab system of London. He quotes Sir Richard Mayne's remarks at the Society of Arts on the course system, although Sir Richard there admitted it to be inapplicable to London; and we are still of opinion that Sir Richard was right, and that Mr. Haddan has not completely obviated the objections to such a system as applied to London.

Miscellanea.

THE CANTERBURY DRAINAGE.—The Home Secretary has given his consent to the carrying out of the plan of drainage submitted by Mr. Pilbrow. The outfall has been visited by the Government Inspector, accompanied by the Local Board Committee, the engineer, and a committee from Fordwich. The outfall has been fixed at a spot below Fordwich, a few yards above the place originally fixed by Mr. Pilbrow.

TRANSPARENCY OF IRON.—At a recent meeting of the Académie des Sciences, M. Sechi made the important announcement of the complete transparency of iron when at a red heat. His own experiments have proved the truth of the fact, provided the thickness of the piece of iron does not exceed one quarter of an inch. This property of the metal appears to explain some of the phenomena respecting analyses which have resulted from the employment of iron.

GOLD IN THE SCOTTISH HIGHLANDS.—A correspondent states that gold has been found in various parts of the Highlands by a gentleman who has had many years' experience at the gold-diggings in Australia and New Zealand. He states that the metal was found in fourteen or fifteen different parts of the country, and that he believes there is gold, more or less, to be found along the boundaries of Argyleshire and Perthshire, and all the way from Glenfine to the head of Glenetive. He has also found lead, copper, silver, and other ores.

THE PNEUMATIC DESPATCH IN PARIS.—Some time ago experiments were made with a view to transmit letters from one post-office to another by means of subterranean pipes, the parcels being propelled by atmospheric pressure. Seven offices are now on the point of being connected by the new system; and it is highly probable, according to the Paris correspondent of the *Morning Post*, that the whole of the post-offices in Paris will eventually receive their letters by this process. The bags will travel at a rate of from 800 to 1,000 French yards a minute.

AN ARTESIAN WELL OF BITTER WATER AND FIRE.—A new artesian well has been sunk by M. Belland, of Salles d'Aude, in the centre of a large alluvial plain, on the left bank of the Aude, in Narbonne. Not only water, but fire springs from this well, which has been sunk about 60 mètres. The water is cold, limpid, and very bitter. It is purgative, and a carburetted hydrogen gas escapes from it. This latter, passing through a narrow tube, burns continuously, with a reddish flame, but it gives forth no odour, and consequently contains no trace of sulphuretted hydrogen or bituminous vapour.

METROPOLITAN WATER SUPPLY.—In the House of Lords, Lord de Mauley called attention to the expediency of supplying water to the metropolis from the superfluous water of the upper part of the Thames, and adduced a number of facts bearing upon the subject, urging their lordships to devise some means by which the superfluous water of the upper part of the Thames might be utilised. The Duke of Richmond said that the question had been carefully gone into by the commission, and he hoped that in the course of the autumn a report would be prepared, in which it would be found that the question had been thoroughly inquired into and considered.

LONDON ASSOCIATION OF FOREMEN ENGINEERS.—The thirty-second half-yearly meeting of members of this society has taken place at the London Coffee House, Ludgate-hill, Mr. Joseph Newton, president, in the chair: the large assembly-room was well filled. The report and balance-sheet were both of a satisfactory character. The present amount of money for all purposes, vested in the trustees, is 1,309*l.*; the number of ordinary members, 105; and of honorary members, 53. Mr. William Naylor read a paper on "Steam-Engine Boilers."

TRIAL OF SAFES AT THE PARIS EXHIBITION.—Mr. Samuel Chatwood, of Bolton, Lancashire, and Mr. Silas C. Herring, of New York, have formally entered into articles of agreement, whereby they stake 15,000 francs each on the issue of a trial of their respective safes by burglars' appliances, such as drilling instruments, gunpowder, crow-bars, &c. They have appointed a joint committee to decide the question between them, the winner to have his 15,000 francs returned, and the loser to have his distributed for charitable purposes in London, Paris, and Washington.

THE ANSTICE MEMORIAL, COALPORT, SHROPSHIRE.—Mr. W. O. Foster, M.P., has contributed 200*l.* towards the fund for erecting an Anstice Institute at Madeley. The proposal is to erect an institute, to include reading-rooms, rooms where working men may sit down with their pipes, if they wish, and enjoy themselves on an evening; also baths, wash-houses, and recreation grounds, where amusements may be indulged in. The Ironbridge tradesmen and the tradesmen and professional men of Broseley, on the other hand, have set their minds upon a free bridge across the Severn. This proposal, however, has collapsed, and the subscriptions have been transferred to the Institution and Recreation Grounds, at Madeley. Mr. Pritchard, M.P., and Mrs. Pritchard have given 300*l.*, making altogether about 1,450*l.*

PUBLIC HEALTH IN SALISBURY.—The city of Salisbury was formerly one of the unhealthiest small cities in the kingdom. The average annual rate of mortality in twelve winter quarters before the sanitary works were undertaken was 30 per 1,000; in the twelve winters subsequent to the establishment of the Local Board of Health, the average annual rate has been 23 per 1,000, which is the winter death-rate of the registrar-general's "country districts" of England. The mortality for the whole year, averaged for twelve years since drainage, is 20 per 1,000, exactly the rate observed during the last severe winter, when the mortality was generally raised all over the kingdom. The city was entirely unaffected by the cholera epidemic of last year, although in 1849 cholera and diarrhœa alone were fatal to 20 in every 1,000 of the inhabitants.

EXPORTS OF RAILWAY IRON.—Notwithstanding the prevalence of adverse influences in some quarters, the export of railway iron from the United Kingdom have attained a respectable importance this year, having amounted in April to 43,974 tons, as compared with 46,673 tons in April, 1866, and 28,667 tons in April, 1865, and for the four months ending April 30 to 133,875 tons, as compared with 135,803 tons in the corresponding period of 1866, and 92,018 tons in the corresponding period of 1865. The exports would not, however, have been sustained so well this year but for an exceptionally large demand from the United States. The exports of railway iron are also well maintained to British India. In the miscellaneous demands for British railway iron there appears, however, to have been a rather considerable falling off this year.

STRIKE AT SUNDERLAND.—In consequence of the excavators, 300 in number, employed at the new Hendon Dock having refused to work unless they received an advance upon their price equal to thirty per cent., they were paid off on Saturday, and the commissioners have decided to stop the night shifts, lay off one engine, and proceed with the cutting of the gullets only, in order to get in the walls and wharfing. There only remain 40,000 cubic yards of marl to remove, 280,000 having already been removed, and of the 40,000 to remove 30,000 are required for backing up the walls when built, and levelling the ground. Only sixty men will therefore be required for the excavation necessary. There is no doubt that the strike arose in consequence of the excavators supposing the completion of the dock was imperative by a given time.

STRATFORD-UPON-AVON.—The foundation-stone of a bridge, to replace the old Mill Bridge, partially swept away by the floods of March, over the Avon, at Stratford, has been laid.——The partial re-erection of the church spire, damaged by lightning some years ago, has been completed.

THE VALUE OF LAND NEAR LONDON.—Eighty-seven acres of land at Edgeware, belonging to St. Bartholomew's Hospital, have been sold recently to the Midland Railway Company for the sum of 45,000*l.*, as settled by arbitration. Up to this time the hospital has derived from it simply an agricultural rent. Time has made it building land.

THE NEW INDIA OFFICE.—The new building was last week inaugurated, so to speak, by "a competitive examination of candidates for appointments in the Engineer Establishment of the Department of Public Works in India." The examiners were Mr. George Preston White, C.E.; Professor Capp, F.R.S.; and Colonel Newmarch, R.A. The examination was conducted in rooms on the second floor.

ARCHÆOLOGICAL INSTITUTE OF GREAT BRITAIN AND IRELAND.—The annual meeting, to be held this year at Hull, will commence on the 30th inst. The Archbishop of York will be the president, and the grand jury-room at the town-hall is to be the reception-room. The arrangements for the week include excursions to Beverley Minster, Hedon, Patrington, Flamborough Head, the Dane's Dykes, Driffield Church, Malton gravel-beds, Howden, Wressel Castle, Selby Church, and Bridlington.

PRINCE CONSORT'S WINDSOR ASSOCIATION.—The annual meeting of this association, established in 1850 by the Prince Consort for improving the condition of the labouring classes of Windsor, Eton, and the surrounding neighbourhood, has taken place in the Windsor Home Park, under the most favourable auspices. The show of fruit and flowers from the royal gardens, the royal nurseries, and gardens of the nobility and gentry of the neighbourhood, was of a finer description than has been witnessed for several years past. Mr. T. Ingram's display from the Queen's Gardens included a very extensive and beautiful miscellaneous collection of plants, fruit, and cucumbers. Whilst the exhibitors were enjoying their dinner, and during the afternoon, the fine band of the Scots Fusilier Guards performed some pieces of music. The prizes were distributed by the Princesses Alice and Louise, and Prince Leopold.

REPORT ON CO-OPERATIVE SOCIETIES.—In a Blue-book lately issued is a report by Mr. Fane to Lord Stanley, on co-operative societies in France, in which the progress of these societies is reviewed. Of the three kinds of co-operative associations, societies of consumption, of credit, and of production, it is to the last Mr. Fane confines his attention. Amongst others he speaks of M. Leclaire's Society, to which the attention of our readers has already been directed in the *Builder*. Mr. Fane states, that while many of the productive societies have collapsed, a few, such as the Society of Masons, are remarkably prosperous. There has been too much faith, he thinks, in the combination of skill and labour, and too little in the co-operation of capital. He is of opinion that societies enabling workmen to effect savings and to learn providence, should have preceded, in France, the formation of productive societies.

HEALTH IN MARYLEBONE.—In the last monthly report of Dr. Whitmore, the Medical Officer of Health for Marylebone, he states that on a very recent occasion great sickness and diarrhœa were produced by the offensive effluvia arising from large accumulations of manure. An outbreak of cattle plague occurred in Malthouse-mews, Lisson-grove, adjoining to which is Carlisle-mews, and in these two places at the time of the outbreak there were sixty cows and from eighty to ninety horses. These places were promptly declared to be an infected district, and a *cordon sanitaire*, so to speak, was placed round it, so that in a very short time immense heaps of manure had accumulated. After the interval of a few days, sickness and diarrhœa broke out amongst the inhabitants, and out of 149 men, women, and children residing in these mews sixty-one were suffering from sickness and diarrhœa. It was not until after an interval of twelve days, and the expenditure of much time and trouble, that he was enabled to get the manure removed.

WORKING MEN'S COLLEGE.—The summer *conversazione* of this excellent institution was held on the 12th inst.

THE WORCESTER MODEL DWELLINGS ASSOCIATION.—The annual meeting of this Association has been held in the Guildhall. Admiral Hastings occupied the chair. The report stated that the prospects of the Association "were cheering, owing to the general rise in the rentals of the buildings." The Gloucester Arms Inn and five tenements adjoining had been sold for 340*l.* and 410*l.* The whole square or block of buildings was now open on all sides. The buildings were in good repair, and the occupants numbered about 140. The arrears of rentals amounted to 1*l.* 13*s.* 9*d.*, and a dividend of 2 per cent. was recommended. The report was unanimously adopted.

METROPOLITAN DRINKING FOUNTAIN AND CATTLE TROUGH ASSOCIATION.—The eighth annual meeting of this useful association has been held. The last year has been a successful one. An anonymous contribution of 1,000*l.*, besides other subscriptions, enabled the Association to add many troughs for cattle and dogs to fountains in various parts of the metropolis and its suburbs, and more are in progress. There are 110 fountains in all under the care of the Association. The annual subscriptions for the year amounted to 546*l.* and the donations to 1,241*l.*, besides the 1,000*l.* already referred to. A legacy of 1,000*l.* will shortly be available. Lord Grosvenor has consented to become the president. The New York people have consulted the Association and are supplying their city with fountains. The large fountain in Hyde Park, erected at the cost of the Maharajah of Vizianagram, is being rapidly proceeded with. The report was unanimously adopted.

WORKS IN BRONZED CAST IRON.—The American Department of the Paris Exposition contains a numerous collection of lamps of various kinds, clock-cases, and other works, all of them executed in bronzed iron. They are the productions of Tucker's Manufacturing Company, of Boston, and are the results of experiments carried on by Mr. Tucker during the last seventeen years. The material employed is American iron of several varieties compounded together, with a comparatively small admixture of the Scottish Coultness iron. A combination of several important qualities is thus obtained. The desired colour is obtained through the union of the carbonized oil with the oxydized metal. This is a *permanent* bronzing, incorporated with the substance of the metal. The Tucker bronzing process is patented in England and France, as well as America, and may be applied to the decoration of stoves, iron bedsteads, and many other works in iron, which at present are usually coated with lacquer or varnish.

TIN WATER PIPES.—An invention of Messrs. Colwell, Shaw, & Willard, is being developed at New York, which is calculated to prove of great sanitary advantage, in providing a means of preventing the contamination of water by lead pipes. The *Scientific American* explains that the pipe differs from the ordinary lead pipe, in being, for its calibre, only about half the thickness of lead, and in being lined throughout with pure block tin, not merely washed or plated with it, but being really a pipe of tin enclosed by one of lead, the two being fused or welded together, forming one solid whole. It has been found that the new pipe is stronger than lead pipe, although weighing only half as much per foot. A powerful hydraulic press, worked by a steam-engine, stands by the side of a furnace, over which is a tank containing the melted lead. Directly under the press is a receiver, at the bottom of which a steel die is placed, the aperture in which corresponds with the external diameter of the pipe. The projecting portion of the press piston fits the receiver, and has a mandrel on its lower end corresponding with the inner diameter of the pipes to be formed. A cone-shaped block of pure tin, having a hole longitudinally through its centre, into which the mandrel fits, is placed in the centre of the receiver directly over the die, the apex of the cone downward. The piston of the press is then lowered until the mandrel engages with the hole in the tin, when melted lead is let in and the receiver is filled to the top of the tin cone. After a few minutes, to give time for the melted lead to form a junction with the outside of the tin, the pressure is applied, and the tin-lined pipe comes continuously through the die, and is coiled on a reel.

PATHS. — A correspondent writes: — "'A Sub.' will get good paths by using less well-boiled tar to dry gravel, free from dirt, put on about 2½ in. thick, with a good sprinkling of spar (Derbyshire), or small pieces of marble on the top. Roll the gravel and tar first a little, then sprinkle with the spar, and roll altogether well. It will improve the paths to put down a low edging of stone, tile, or wood, first; it keeps the edge of the path firm; no weed or damp will then lodge upon it.

ST. THOMAS'S HOSPITAL.—At the last weekly meeting of the Metropolitan Board of Works, the superintending architect, in answer to a resolution of the Board, reported that the sums paid, or agreed to be paid at Stangate, for the Southern Embankment, were 324,492*l.* The surplus lands were sold to the trustees of St. Thomas's Hospital for 108,000*l.*, which was about one-third of the entire cost. The site of the new hospital extends from Westminster Bridge to Lambeth Palace, and is bounded on the river embankment by a new public road, 20 ft. wide, and by New Palace-road, on the eastern side, 60 ft. in width. The cost of clearing the ground will be 324,492*l.*; for 8½ acres the governors of the hospital pay 95,000*l.*; for the triangular piece of ground adjoining, 13,000*l.*; making a total of 108,000*l.*, which, deducted from the 324,492*l.*, leaves 216,412*l.*, or two-thirds of the total cost of the two new roads and embankments.

THE NEW MANCHESTER CEMETERY.—The low-lying portion of this cemetery has been submerged. It is defended from the river by an embankment some 7 or 8 ft. above the average water-mark. The rise of the river was so sudden, and the weir at the Messrs. Wood's print works offered so effectual a barrier to the flow of the water, that the flood speedily rose above the embankment and covered the burial-ground for a distance of 20 or 30 ft. The flood did not wash up the soil, or disturb any of the graves that had been closed; but it is usual to keep two or three graves unclosed, so that more interments than one may be made in the same graves, and the water, by overflowing these open graves, set five coffins afloat, one of which was carried into the stream. The city surveyor visited the ground, and in his opinion the only effectual mode of guarding against the repetition of such an occurrence will be to build a more solid embankment to about twice the height of the present one.

TENDERS

For extension of present shop, show-rooms, and warehouse, for Messrs. Brice & Sons, in the drapery, Northampton. Mr. George Low, architect. Quantities supplied by Mr. Frederick Johnstone:—

Smith, Brothers (accepted)	£5,415 0 0

For alterations and repairs at Camden Church, Camberwell. Mr. F. W. Meakin, architect:—

Harland & Fisher	997 0 0
Jones	839 0 0
Garland & Sons	804 0 0
Colls & Son	786 0 0

For parsonage-house for the incumbent of Holy Trinity, Church, Kentish-town. Messrs. Beck & Lee, architects. Quantities by Messrs. Pain & Clark:—

Ashby & Sons	£3,333 0 0
Conder	3,215 0 0
Manley & Rogers	3,190 0 0
Colls & Son	3,184 0 0
Woodward	3,168 0 0
Foster	3,020 0 0
Webb & Sons	2,879 0 0

For building house and tavern, Seven Sisters'-road, Holloway, for Mr. J. Pigot. Messrs. Finch Hill & Paraire, architects. Quantities supplied by Mr. Doughney:—

Warne	£4,250 0 0
Hoare	4,057 0 0
Wiltshire & Harold	3,998 18 0
Langmead & Way	3,746 0 0
Newman & Mann	3,590 0 0
Eaton & Chapman	3,513 0 0

For residence, Tettenhall. Mr. G. Bidlake, architect:—

Trow	£3,600 0 0

For rebuilding Swan-hill Congregational Church, Shrewsbury. Mr. G. Bidlake, architect:—

Nevitt	£1,477 0 0

For double villa residence, Penn-road, Wolverhampton. Mr. G. Bidlake, architect:—

Higham	£1,187 0 0

For mission-room, Broseley, Shropshire. Mr. G. Bidlake, architect:—

Smithyman	£536 0 0

For alterations and additions to Tor Lodge, Tettenhall. Mr. G. Bidlake, architect:—

Heveningham	£1,120 0 0

For alterations at the Three Cranes public-house, Bricklane, Spitalfields, for Messrs. Truman, Hanbury, & Co. Mr. J. Tanner, architect:—

Turner & Son	£2,129 0 0
Brown	1,790 0 0
Eaton & Chapman	1,589 0 0
Marr	1,573 0 0

For residence for Mr. Harry Bridger, Old Shoreham, Sussex. Messrs. Goulty & Gibbins, architects:—

Cheeseman & Co.	£2,765 0 0
Howell	2,643 0 0
Nightingale	2,470 0 0
Simms & Marten	2,456 0 0
Shearburn	2,400 0 0
Bland	2,352 0 0
Chappell (accepted)	2,346 0 0

For three houses, Queen's-road, Bayswater, for Metropolitan Railway. Messrs. Withall & Evers, architects:—

Bywater	£4,880 0 0
Tongue	4,666 0 0
Ebb & Sons	4,580 0 0
Webb & Sons	4,385 0 0
Richardson	4,092 0 0
Foster	3,972 0 0

For erecting public-house, Gainsford-street, Kentish-town-road. Mr. J. F. Newman, architect:—

Scrivener & White	£2,287 0 0
Webb & Sons	2,236 0 0
Manley & Rogers	2,200 0 0
White	2,158 0 0
Mann	2,143 0 0
Matthews	2,040 0 0

For rebuilding 45, Carter-lane, City. Mr. Whichcord, architect:—

Ashby & Horner	£1,325 0 0
Piper & Wheeler	1,253 0 0
Macey	1,239 0 0
Brass	1,197 0 0
Turner	1,171 0 0
Newman & Mann	1,159 0 0
Hill & Sons	1,147 0 0
Webb & Sons	1,137 0 0

For rebuilding No. 43, Carter-lane, City. Messrs. J. Young & Son, architects:—

Conder	£2,629 0 0
Macey	2,613 0 0
Brass	2,542 0 0
Piper & Wheeler	2,473 0 0
Hill & Sons	2,459 0 0
Webb & Sons	2,345 0 0
Ashby & Horner	2,325 0 0
Newman & Mann	2,295 0 0

For new wing to Hospital for Women, Soho-square. Mr. E. L. Bracebridge, architect:—

Read & Sons	£9,220 0 0
Patman & Co.	8,093 0 0
Wood & Co.	7,983 0 0
Myers & Sons	7,890 0 0
Piper & Wheeler	7,637 0 0
Hill & Son	7,560 0 0
Webb & Sons	7,157 0 0
Axford	7,087 0 0
Wagstaff & Sons	6,960 0 0

For alterations in Finsbury-place. Mr. H. J. Hammon, architect:—

Foster	£2,590 0 0
Hennor	2,489 0 0
Brass	2,389 0 0
Webb & Sons	2,345 0 0
Pritchard	2,337 0 0
Macey	2,293 0 0
Browne & Robinson	2,225 0 0

For redecorating St. Paul's Church, Islington. Mr. T. Matthews, architect:—

Ramsay	£656 0 0
Dove, Brothers	655 0 0
Webb & Sons	649 0 0
Smith & Sons	647 17 0
Sewell & Sons	615 0 0
Moreland & Burke	597 0 0

For erecting parsonage-house, Haverstock-hill. Messrs. Beck & Lee, architects:—

Ashby & Sons	£3,333 0 0
Conder	3,215 0 0
Manley & Rogers	3,190 0 0
Colls & Son	3,184 0 0
Woodward	3,168 0 0
Foster	3,020 0 0
Webb & Sons	2,879 0 0

For Stockport Baptist Chapel. Messrs. Habershon & Pite, architects:—

Brown	£6,490 0 0
Weatherly & Eymer	5,947 0 0
Atkinson	5,852 0 0
Espley	5,600 0 0
Robinson	5,600 0 0
Statham & Sons	5,185 0 0
Hughes	5,121 0 0
S. & W. Pattinson	4,995 0 0

For cottage, new club-room, and other works, at Prince Edward's Tavern, Park-road, Holloway. Mr. Thompson, architect. Quantities supplied:—

Barker	£567 0 0
Greenfield	534 0 0
Ramsay	503 0 0
Eaton & Chapman	476 0 0
Poxon & Smith	445 0 0
Shurmur	417 0 0
Warne (accepted)	410 0 0
Bradbury & Brett	374 0 0

For building new parsonage-house for St. Peter's, Rochester. Mr. Ewan Christian, architect. Quantities supplied by Messrs. Goodman & Vinall:—

Naylar (accepted)	£1,479 0 0

For building house, Air-street, Regent-street, for Mr. Ralph Bodilly:—

Nightingale (accepted)	£755 0 0

For building new inn at Rochester, for Mr. George Beer, Canterbury. Mr. John Green Hall, architect:—

Petts	£1,423 12 0
Sollitt	1,376 0 0
Naylar (accepted)	1,147 0 0*

* After deductions for old materials.

For residence for Mr. Henry Mills, on part of Bescott Estate, Wednesbury, near Walsall. Messrs. William & Samuel Horton, architects:—

Taylor, Brothers	£2,200 0 0

For repairs, alterations, and refitting the parish church of Harmston, Lincolnshire. Mr. Withers, architect:—

Huddleston	£1,370 0 0
Binns & Co.	1,347 0 0
Locke	1,345 0 0
S. & W. Pattinson	1,300 0 0
Bellamy	1,108 6 0
Stiles	1,100 0 0
Barker	1,028 0 0

For repairs and refitting to the parish church of West Barkwith, Lincolnshire. Mr. Withers, architect:—

Bellamy & Barker	£524 0 0

For alterations and additions to the Balmoral Castle, Caledonian-road, for Mr. Baines. Quantities not supplied:—

Balston & King	£237 0 0
Brett & Bradbury	170 0 0
Bevington	165 0 0

For repairs and additions to six houses, Caledonian-street, King's-cross. Mr. E. L. Blackburne, architect. Quantities not supplied:—

Waters	£950 0 0
Smith & Biggs	698 0 0
Ramsay	686 0 0
Blackmore & Morley	622 10 8
Bradbury & Co.	613 0 0
Taylor & Son	445 0 0
Ladd	297 0 0

For laundry buildings to convent, Central Hill, Norwood. Mr. Goldie, architect. Quantities supplied by Mr. Scofield:—

Myers & Sons	£2,240 0 0
Longmire & Burge	2,110 0 0
Simpson	2,065 0 0
Lawrence & Maw	1,999 0 0
King & Sons	1,948 0 0
Gammon	1,903 0 0
Nightingale	1,839 0 0
Roberts	1,770 0 0

For the erection of additional buildings and alteration of the old buildings at the Red Coat School, Stepney-green. Mr. Henry Stock, architect. Quantities supplied by Messrs. Marsland & Widdows:—

Hill & Keddell (accepted)	£2,177 0 0

For rebuilding the Old Pied Bull public-house, Holloway-road, for Messrs. Taylor & Walker. Mr. Charles Dunch, architect. Quantities supplied by Mr. G. P. Raggett:—

Hill & Keddell (accepted)	£2,493 0 0

For new parsonage, Holy Trinity, Wallington, near Croydon, for Mr. N. Bridges. Messrs. E. Habershon, Brock, & Webb, architects:—

Simpson (accepted)	£1,650 0 0

For part restoration of the offices of the London Society for the Propagation of the Gospel amongst the Jews. Messrs. E. Habershon, Brock, & Webb, architects:—

Manley & Rogers	£261 0 0
Warne & Co.	260 0 0
Cole	255 0 0
Morant	185 0 0

For alterations at 6, Russia-row, Milk-street, City. Mr. William Smith, architect:—

Brisley	£426 0 0
Chretin	407 7 0
Crabbe & Vaughan	394 0 0
Fanhall & Weeks	364 0 0
Sabey	325 0 0
Eaton & Chapman	310 0 0

For six houses, Cross-street, Islington. Mr. William Smith, architect. Quantities by Messrs. Pain & Clarke:—

Webb & Sons	£3,069 0 0
Eaton & Chapman	2,998 0 0
Nightingale	2,883 0 0
Sabey	2,816 9 0
Thompson	2,795 0 0
Bishop	2,695 0 0
Crabbe & Vaughan	2,549 0 0
Henshaw	2,521 0 0
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Flint	£1,100 0 0
Crabbe & Vaughan	1,050 0 0
Brisley	1,000 0 0

TO CORRESPONDENTS.

"The Ellesmere Memorial."—An Inquirer wishes to know what is being done in this matter.

Proposed Assistant Engineers' and Draughtmen's Association.—Several letters received on this subject.

S. M. H. (next week).—G. R. (has been posted).—W. H. (send particulars).—Poor Clerk (at any Artists' Colourman's).

F. J.—T. N.—W. W.—J. M.—A. C.—T. P.—J. T.—T. R. W. E.—C. S. M.—T. P.—W. & Son.—J. G. N.—A Draughtsman.—A Well-wisher.—T. L. D.—A. R.—Mr. T.—H. N. H.—Mr. W.—R. W. P.—W. & S. H.—T. T.—M.—W. M.—C. S.—M. & Co.—R. & R.—R. R. N.

We are compelled to decline pointing out books and giving addresses.

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

Advertisements cannot be received for the current week's issue later than **THREE o'clock, p.m.** *on THURSDAY.*

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[ADVERTISEMENTS.]

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MESSRS. DRIVER & CO. are instructed to OFFER the above FREEHOLD BUILDING LAND for SALE by AUCTION, at the MART, Tokenhouse-yard, on FRIDAY, AUGUST 9, at TWO o'clock precisely (unless the whole or any part thereof is previously disposed of by private contract). It comprises about 77 acres of exceedingly desirable, well-timbered land, having extensive frontages to the high turnpike-road and Thames Ditton common, a considerable portion being thus immediately available for building operations. The soil is light and healthy, and the neighbourhood one of the most attractive for residences in the vicinity of London. The property will be sold in blocks or lots, to meet the requirements of persons desiring sites for villa residences of a superior class, the estate itself being peculiarly adapted for a first-class building investment.—Particulars may be had of Messrs. FEW & CO. Solicitors, 2, Henrietta-street, Covent-garden, W.C.; and of Messrs. DRIVER & CO. Surveyors, Land Agents, and Auctioneers, 4, Whitehall, London.

SEVENOAKS.—BRADBOURNE ESTATE.—An exceedingly valuable and important Freehold Residential and Building Property, comprising about 230 acres of beautifully timbered, undulating, and well-watered land, surrounded by turnpikes and other excellent roads, lying between Sevenoaks and River Head, and within an hour's ride of London. In lots. Immediate possession.

MESSRS. DRIVER & CO. are instructed to offer for SALE by AUCTION, at the MART, Tokenhouse-yard, London, on FRIDAY AUGUST the 9th, at TWO o'clock precisely (unless previously disposed of by private contract), in four lots, this very valuable FREEHOLD ESTATE: comprising about 230 acres, situated and lying between Sevenoaks and River Head, and near Lord Amherst's, Kippington, and the Marquis Camden's Parks. The London, Chatham, and Dover Railway (Sevenoaks Extension and the South-Eastern Railway (Tunbridge line), form a junction on this property, and there is to be a joint station on the estate where the two railways meet, which will give very great facilities for the development of this fine building property. The estate is nearly all in hand, and therefore immediate possession can be had on completion of the purchase. Sevenoaks has long been celebrated as a healthy district, and only wants additional railway accommodation in order to make it one of the most desirable residential localities round London. When the Junction Station is formed nearly all parts of London can be reached in about an hour and a-half, the termini being at London Bridge, Victoria, Cannon-street, Blackfriars, Charing-cross, Farringdon-street, and King's-cross. The residential portion comprises about 95 acres of land, partly fronting the high road; the mansion, which is situated on beautiful park-like land, is built of stone, and affords every accommodation for a family. It is well placed, and has excellent grounds, and all necessary conveniences for a gentleman's family. On this part of the property there are valuable springs and pools of water, which if a purchaser chose to utilise might be turned to considerable profit. This residential portion would in no way be affected by the remainder of the estate being devoted to building purposes, for which it is specially available. The immediate building properties are comprised in two districts, the one being the 20 acres lying between the South-Eastern Railway and the turnpike road in front of Lord Amherst's Park, towards River Head, and the other portion, 125 acres, being that tract of land on which Mount Harry-wood is situated, and which abuts on three sides on good roads, with frontage nearly on to Sevenoaks. Also the portions of the property comprising about 25 acres, situated on the high road, and in front of Bradbourne, between Mr. Wreford's estate and the high road, and which are adapted for building and accommodation purposes. The soil for the most part is loam, with a subsoil of gravel.—Particulars are preparing, and may shortly be had; in the meantime information may be obtained of Messrs. FAIRFOOT & WEBB, Solicitors, Clement's-inn, W.C.; and of Messrs. DRIVER & CO. Surveyors, Land Agents and Auctioneers, 4, Whitehall, London.

PECKHAM RYE.—On the Rye-hill Estate.—For Sale, by order of Mortgagees.—To Builders and Speculators.

MESSRS. DEBENHAM, TEWSON, & FARMER will SELL, at the MART, near the Bank, on THURSDAY, JULY 25, at TWO, TWO PAIRS of semi-detached brick-built CARCASSES of HOUSES, situate Nos. 5, 6, 7, and 8, Rye-hill-road. Held for ninety-eight years, at 10l. each pair.—Particulars of Messrs. WILLOUGHBY & COX, Solicitors, 13, Clifford's-inn, E.C. and of the Auctioneers, 80, Cheapside.

NORBURY-HILL, STREATHAM, SURREY, 7 miles by road from London, and about a mile from the present Streatham Common Station on the London, Brighton, and South Coast Railway, but within 600 yards of the new station which is likely shortly to be built.—A beautifully positioned, valuable Freehold Building Estate of about 40 acres, admirably adapted for the erection of residences of a good class, and for the display of ornamental grounds.

MESSRS. DEBENHAM, TEWSON, & FARMER have been favoured with instructions to SELL, at the MART, near the Bank, on TUESDAY, JULY 30 (unless an acceptable offer be previously made), in one lot, the whole of the very valuable FREEHOLD BUILDING ESTATE known as Norbury-hill, in the favourite parish of Croydon, close to its junction with Streatham. It is salubriously situated upon a commanding eminence, from which are presented upon all sides extensive views of some of the most charming scenery near London, embracing Wimbledon, Sydenham, the Crystal Palace, and the boldly-defined outline of the Surrey hills. The land slopes from its summit gracefully down to the main London road, to which there is a long and valuable frontage. The neighbourhood is very attractive, and will undoubtedly, ere long, be almost entirely devoted to building purposes. Gas is laid on to the road, and water to the boundary, and excellent brick earth may be raised upon the estate. The main line between Victoria, Croydon, and Brighton passes within a short distance, and it is proposed to form a new station within a few hundred yards of this estate.—Plans, particulars, and conditions of sale of C. M. C. WHATMAN, Esq. Solicitor, Salisbury; at the Mart; and of the Auctioneers, 80, Cheapside.

MAIDA-HILL.—Leasehold Investment.

MESSRS. DEBENHAM, TEWSON, & FARMER will SELL at the MART, near the Bank, on THURSDAY, AUGUST 8, the capital DWELLING-HOUSE and SHOP, with two-stalled stable and slaughter-house, No. 73, Princess-street, Maida-hill, one door from the Edgware-road: comprising five good bedrooms, drawing-room, back sitting-room, front and back kitchens, and offices, held on lease for 91¼ years (less 14 days) from the 24th JUNE, 1830, at 5l. per annum, and underlet on a 21 years' lease from the 24th JUNE, 1858, at the low rental of 53l. 10s. per annum. It is subject to a mortgage, containing a proviso of redemption on the 4th of AUGUST, 1869, for 40l. at 5l. per cent. per annum, and will be sold subject to such mortgage.—Particulars of G. W. MARSDEN, Esq. Solicitor, 27, Queen-street, Cheapside; at the Mart; and of the Auctioneers, No. 80, Cheapside, E.C.

CITY of LONDON, on the Borders of.—Valuable Freehold Building Land, covering an area of 15,250 square feet.

MESSRS. DEBENHAM, TEWSON, & FARMER will SELL, at the MART, near the Bank, on THURSDAY, AUGUST 8th, at TWO, a very valuable FREEHOLD BUILDING SITE, situate on the borders of the City, between Whitecross-street and Golden-lane, within three or four minutes' walk of Aldersgate-street station, containing the important area of 15,250 square feet, and admirably adapted for the erection of a manufactory, warehouse, model lodging-houses, stabling, &c.—Particulars of F. C. BULLEN, Esq. Solicitor, 7 and 8, Barge-yard-chambers, Bucklersbury; and of the Auctioneers, 80, Cheapside.

LOUGHTON PARK ESTATE, ESSEX.—Choice Freehold Building Sites, adjoining the station, and within forty minutes of the termini at Fenchurch street and Bishopsgate.

MR. V. BUCKLAND is instructed to SELL by AUCTION, at the MART, Tokenhouse-yard, Lothbury, on THURSDAY, AUGUST 1st, at TWO o'clock precisely, the first portion (consisting of about thirty acres) of a valuable FREEHOLD BUILDING ESTATE, known as Loughton Park, adjoining the Railway-station, and extending by a new road through the centre of the estate to the crown of the hill. The property commands fine views of Epping Forest, the valley of the Roden, and a vast extent of interesting scenery to the south and west. It is well timbered, and will be sold in lots, from a quarter of an acre to three and four acres in extent, according to position. Sewers are laid down for house and surface drainage, and gas and water will be supplied. Strict stipulation will be made as to the value of houses to be erected.—Particulars with plans may be obtained of Messrs. GELLATLY, SON, & WARTON, Solicitors, 3, St. Michael's-alley, Cornhill; of J. G. B. MARSHALL, Esq. Stratford; at the Crown Inn, Loughton; Baldfaced Stag, Buckhurst-hill; at the Mart; and of Mr. V. BUCKLAND Surveyor, 73, Cannon-street, City.

CITY OF LICHFIELD.—Important to Railway Contractors, Colliery Proprietors, &c.—Great Sale of valuable New Railway Materials nearly 15,000 Tons of Ironwork.

C. GILLARD begs to announce that he has received positive instructions to SELL by AUCTION, without reserve, on WEDNESDAY, the 24th day of JULY, 1867, the valuable MATERIALS purchased for the formation of the Sutton Coldfield and Lichfield Line of Railway, and now lying principally at the South Staffordshire Railway Station, Lichfield, and the Sutton Railway Station. The materials will comprise about 1,000 Tons of best tested Wrought-iron PERMANENT RAILS, 78 lb. to the yard; 350 tons of chairs, about 25 lb. each; 40 tons of fish plates, 20 tons of nuts and bolts, 20 tons of spikes, 10,000 wood sleepers, well seasoned. The whole will be Sold in convenient lots, at or near the South Staffordshire Railway Station, Lichfield. The Sale will commence punctually at HALF-PAST TWELVE.—Catalogues to be obtained from the Auctioneer, Lichfield; Mr. H. GILLARD, Stafford; the "Midland Counties Herald Office," Birmingham; the Swan Hotel, Wolverhampton; Bush Hotel, Dudley; Hen and Chickens Hotel, Birmingham; the George Hotel, Walsall; and the principal Hotels at Liverpool, Manchester, and Sheffield.

WALWORTH.—To Packing-case Makers, Steam-sawyers, Manufacturing Joiners, Engineers, Builders, Contractors, and Others.—Extensive Manufactory, with steam-power, house and offices, and large yard, with the advantage of immediate possession.

MESSRS. HARDS & VAUGHAN will SELL by AUCTION, at the NEW AUCTION MART, Bank, on THURSDAY, AUGUST 1, at TWO, the valuable and important long LEASEHOLD, brick-built MANUFACTURING PREMISES, known as the Osborne Steam-saw Works, Park-place, Walworth, together with the costly fixed machinery, all in complete working order. The factory has been recently built, regardless of cost, with all modern appliances, and consists of three spacious floors, exclusive of basement, having a superficial area of about 7,300 feet, well lighted, and fitted with trap-doors, cranes, &c. with ready means of communication, together with engine and boiler houses in the basement, and well of spring-water, the supply of which saves fully 30l. per annum; range of stoves, engineers' shop, stabling for eight horses, lofts, &c.; manager's house, principals' and clerks' offices, strong room, foreman's office, and large yard, with two entrances. There is also a timber-yard in John-street, close to the premises. The premises have been in the occupation of Messrs. Gore & Izzard, packing-case makers, steam-sawyers, and timber-merchants, up to June, 1867, and the purchaser will have the advantage of vacant possession on completion. These valuable premises, with steam-power, are moderately estimated to be worth 450l. per annum, and are held for about fifty years at a ground-rent.—Particulars and conditions of sale may be had of WILLIAM BRISTOW, Esq. Solicitor, Greenwich, and 25, Laurence Pountney-lane, E.C.; ROBERT PECKHAM, Esq. 17, Great Knightrider-street, Doctors'-commons; or of the Auctioneers, 2, Abchurch-yard, City, and Greenwich, S.E.

RICHMOND HILL, SURREY.—Important Sale of First-class Building Land, near the town, and having very extensive frontages Hill-rise and Friars'-hill-road.

MESSRS. BEADEL are instructed to offer for SALE by AUCTION, at the MART, London, on TUESDAY, the 23rd JULY, 1867, in Two Lots, about five acres of first-class FREEHOLD BUILDING LAND. The first plot comprises 1a. 0r. 20p. having a frontage of 265 feet to Hill-rise, at present forming the major portion of the garden attached to Gloucester-villas, in the occupation of the Right Hon. Lord Onslow. The second plot, which adjoins the former, is an extremely valuable site. It contains 4a. 0r. 35p. and has a frontage to Hill-rise of 396 feet, and to Friars'-hill-road of 453 feet, offering a rare opportunity for the acquisition of land in this favourite locality for the development of extensive building operations. Most beautiful views are obtained from the property; the whole is Freehold, and will be sold with possession on completion of the purchase.—Particulars, with plans and conditions of sale, may be obtained of Messrs. WORDSWORTH & BLAKE, South Sea House, Threadneedle-street, E.C.; at the Mart, London; of Mr. CHANCELLOR, King-street, Richmond; and of Messrs. BEADEL, 25, Gresham-street, E.C.

RICHMOND-HILL, SURREY.—One of the most charming Properties in the county, distinguished as Cardigan House, situated on the crown of Richmond-hill, the grounds occupying the undulating land from Hill-rise to the lower road, magnificent views of the surrounding country being obtained from the terrace-walks. The whole forming a most desirable freehold Residential Estate. On the opposite side of Hill-rise are about five acres of very valuable Building Land, having extensive frontages both to Hill-rise and Friars'-stile-road, offering first-class sites for the erection of Mansions in this choice locality.

MESSRS. BEADEL are instructed to SELL by AUCTION, on TUESDAY, the 23rd day of JULY, at the MART, London, at ONE o'clock precisely (unless previously disposed of by Private Contract), the above RESIDENTIAL ESTATE and LAND. The Mansion is approached by a winding carriage-drive from Hill-rise, with entrance-lodge, is substantially erected and conveniently arranged, and contains handsome entrance-hall, with principal staircase, library, dining-room, elegant drawing-room, and on the upper floor boudoir, gentleman's room, 13 bed and dressing rooms, linen room, and water-closet to each floor. The domestic offices, also on ground floor, are very complete, and there are capital rooms, cellars, &c. in the basement. The pleasure-grounds, which adjoin those of Lansdown House, are thickly studded with ornamental timber of large growth, and planted with choice shrubs. The lawn is of considerable extent, and with the flower-garden is laid out in a most tasteful manner, with fountain, summer-house, and conservatory. The stabling, to which there is a separate approach from the lower road, has accommodation for seven horses, with double coach-houses, and on the floor over are a set of rooms for men-servants, with large hay and straw loft. The Freehold Building Land, which has a total frontage to Hill-rise of 661 feet, and to Friars-stile-road of 453 feet, contains an area of over five acres, and will be offered in two lots, affording an unusual opportunity for the acquisition of land in this most favourite locality, either for the erection of mansions or for division into smaller plots. The ground is so situated as to command the most extensive views, and forms the choicest site in or about Richmond.—Plans, with particulars and Conditions of Sale, may be obtained of Messrs. WORDSWORTH & BLAKE, South Sea House, Threadneedle-street; at the Mart; also (with orders to view) of Mr. CHANCELLOR, 1, King-street, Richmond; and of Messrs. BEADEL, 25, Gresham-street, E.C.

VICTORIA-STREET, WESTMINSTER.—First-class Freehold Groundrent of 775l. and Three Freehold Buildings, with possession.

MR. PHILLIP D. TUCKETT is instructed by the Westminster Improvement Commissioners to SELL by AUCTION, at the Mart, Tokenhouse-yard, on TUESDAY, JULY 30, at ONE o'clock, in Four Lots, a First-class FREEHOLD GROUND-RENT of 775l. per annum, with Parliamentary title, amply secured upon the magnificent establishment known as Messrs. J. & J. Vickers' Distillery, forming the corner of Victoria-street and Horseferry-road, the rental value of which may be estimated at from 3,000l. to 4,000l. per ann.; and Three unfinished Freehold Houses on the south side of Phillips-street, Victoria-street, erected in a most superior manner, with iron girders and fireproof floors, and admirably adapted for chambers or offices, or for commercial or manufacturing business. The last three lots will be sold with possession, and will form most remunerative investments in this rapidly-improving neighbourhood.—Particulars of Messrs. MAYHEW, SALMON, & WHITING, Solicitors, 20, Great George-street, Westminster; of Mr. C. W. JACQUES, 4, Victoria-street; or of Mr. PHILIP D. TUCKETT, Land Agent, Surveyor, &c. 76, Old Broad-street, E.C. and (late Mr. Moxon), 84, Martin's-place, Trafalgar-square, W.C.

In Chancery.—10 Acres of Freehold Building Land close to Ashford Station on the South Western Railway, in 20 lots, with conveyances at a small fixed charge.

MR. PHILIP D. TUCKETT is instructed to SELL by AUCTION, at the MART, Tokenhouse-yard, on TUESDAY, JULY 30th, at ONE o'clock, in 20 Lots, an eligible FREEHOLD ESTATE, fully ripe for building, most pleasantly situated close to the handsome new Church between the railway station and village of Ashford, Middlesex, one lot containing five acres, and the others having 40 feet frontages, with depths of 150 feet and 400 feet. Detailed particulars of Mr. RICHARDSON, Ashford; of P. W. DOLMAN, Esq. 39, Jermyn-street, S.W.; or of Mr. PHILIP D. TUCKETT, Land Agent, Surveyor, &c. 76, Old Broad-street, E.C.; and 3, St. Martin's-place, Trafalgar-square, W.C.

TO ARCHITECTS AND OTHERS.

ARCHITECTURAL DRAWINGS COLOURED for Competition or Exhibition; Perspectives, Designs, Sketches, or Finished and Working Drawings prepared from rough sketches or instructions. First-rate references from eminent men.—Address, ARTIST, 8, Bessborough-street, Pimlico, S.W.

BRECON WATER-WORKS.—To PLUMBERS.—WANTED, THREE PLUMBERS, for a few months.—Application, stating wages required, to be made, by letter, to THE SURVEYOR, Local Board of Health, Brecon.

TO ARCHITECTS, &c.—PARTNERSHIP.—A Gentleman of experience is desirous of Joining an Architect and Surveyor of moderate practice.—Address, W. W. 271, Vauxhall-bridge-road, S.W.

TO MASONS AND WALLERS.

GOOD WORKMEN may meet with EMPLOYMENT, at the New University Buildings, Gilmorehill, Glasgow, on application to WILLIAM BRADFORD, Foreman of Works. The works are expected to last from two to three years.

PUPIL.—An Architect of some position requires a well-educated gentlemanly YOUTH, with premium. A salary would be given as soon as proficiency was attained. A respectable trustworthy Lad required in the same office.—Address, F. R. I. B. A. 126, Strand, W.C.

WANTED, a JUNIOR CLERK for a Builder's Office.—Address, stating age, salary, and where last employed, to C. K. Post-Office, Birmingham.

WANTED, for a Country Village, an uncertificated SCHOOLMISTRESS, whose husband or son would be employed partly in the school, and partly as assistant clerk in the Estate Office. Average school attendance, 70. A liberal salary will be given, with house and garden free. Both applicants must give satisfactory references with regard to efficiency and character. Requirements—Music, drill, needlework, reading, writing, and arithmetic.—Apply, with fullest particulars, to H. U. D. Carlton Club, Pall-mall, London.

TO IRONMONGERS.

WANTED, a steady Man, EMPLOYMENT as HOT or COLD WATER HAND, Gas-fitter, Range-fitter, or General Hand. Can turn his hand to any of the above branches. Good reference if required.—Address, T. R. 15, Verona-street, York-road, Battersea, Surrey.

WANTED, an OFFICE BOY, who can write a good plain hand and trace drawings.—Apply, HOUSEKEEPER, 20, Cockspur-street, S.W.

WANTED, a JUNIOR ASSISTANT who writes a good hand, and is quick at figures. One who has had some experience in a Builder's Office preferred.—Address, X. Y. Post-office, King-street, Westminster.

WANTED, in a DEAL-YARD and SAW-MILL, a first-class MAN as GENERAL FOREMAN and SALESMAN; one that can take the entire management of yard preferred.—Address, 99, Office of "The Builder."

WANTED, a good GRAINER and MARBLER (one who is a sign writer as well preferred). None need apply who cannot give good testimonials as to sobriety.—Address, stating lowest wages for a permanency, to T. T. care of Mr. Penny, 1, Ivy-lane, Paternoster-row, E.C.

WANTED, a DRAUGHTSMAN, for about a Month's Work.—Address, Mr. BUCK, Tool Maker, Edgware-road, N.W.

WANTED, immediately, a CLERK of the WORKS. Salary Two Guineas a week.—Address, stating references and last employer, Rev. HERBERT WILLIAMS, Brecon, South Wales.

TO ARCHITECTS' ASSISTANTS.

WANTED, a thoroughly qualified ARCHITECT'S ASSISTANT. Must be a good Draughtsman.—Apply to Mr. R. J. GOODACRE, Architect, 5, Friar-lane, Leicester.

WANTED, a good CARVER and LETTERER, accustomed to Tombs and Memorials.—Apply to W. LANGDALE, Builder, Whitby, Yorkshire.

TO HANDRAIL WORKERS AND FIXERS.

WANTED, a person fully competent to such Work, at some houses at the West-end.—Address, with references, to No. 87, Office of "The Builder."

TO BUILDERS' CLERKS.

WANTED, one that is well up in every detail connected with the duties of a BUILDER'S OFFICE. He must be a quick and accurate accountant.—Apply, stating references, age, and salary required, to M. M. 9, Fitzroy-road, Regent's Park, N.W.

WANTED, in a Land and Estate Agent's Office, a CLERK and ASSISTANT. One that can survey, &c. preferred.—Address, stating age, salary required, and last engagements, 923, Office of the Builder."

WANTED, a good JOBBING BRICKLAYER and CARPENTER.—Apply to Mr. GEO. PICKERDEN, 29, Union-street, Hackney-road, N.E.

WANTED, an active Man, as CLERK of the WORKS, for the erections of a Chemical Works.—Apply, stating salary, and references, to BOX 190, Post-office, Bristol.

TO ARCHITECTS AND LAND SURVEYORS.

WANTED, a RE-ENGAGEMENT. Accustomed to working, detail, and competition drawings, and thoroughly up in the general routine of the above offices. Salary moderate.—Address, 190, Office of "The Builder."

WANTED, GRAINING and MARBLING by PIECE-WORK.—Address, X. Y. 91, Charrington-street, Oakley-square, N.W.

WANTED, by a respectable Young Man, a SITUATION as IMPROVER to the Plumbing. No objection to fill up time with painting.—Address, T. B. 24, Gantham-street, Tredegar-road, Bow.